





АЛЕКСАНДР БЕК  
ЖИЗНЬ БЕРЕЖКОВА

ИЗДАТЕЛЬСТВО ЛИТЕРАТУРЫ  
НА ИНОСТРАННЫХ ЯЗЫКАХ  
Москва



ALEXANDER BEK  
BEREZHKOVA  
THE STORY OF AN INVENTOR

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THE ADROS ENGINE

"You don't say so!" I cried.

Nothing is more stimulating to a narrator than this simple well-timed interjection.

"I tell you, it was terrific!" Berezhkov went on. "I felt like shouting, but I was so excited I could not find my voice. There he was, flying—can you imagine it!—actually flying over the Khodinka airfield."

"Well I never!"

"It was terrific! Marvellous!"

Berezhkov was excitedly repeating his pet phrases as he warmed to his theme. My interest—possibly exaggerated for purely professional reasons—was obviously giving him the keenest pleasure. He liked to tell a story and was good at it. Just then he made a sustained pause in the most interesting place.

He regarded me quizzically with his small greenish eyes and moved his large smiling lips as if tasting the flavour of the moment.

I knew Berezhkov to be a keen lover of scientific adventure stories and thrilling novels with fast-moving plots, and it struck me that the story he was telling with such gusto sounded just like a chapter out of one such novel. Could it be just fantasy, I wondered.

Berezhkov seemed to read my thoughts.

"I'll show you a photograph if you like," he said challengingly, and without waiting for my reply he rose from his chair. I knew he had turned forty that year, but tall, lean and mercurial, he looked fully ten years younger. His hair was cut short like a boy's and this well became him.

He pulled out a desk drawer, took from it a large packet, and shook a heap of photographs out of it. Looking over his shoulder I had glimpses of group photographs and portraits, Berezhkov on a motor-cycle next to Pushkin's monument in Moscow, other familiar sights of Moscow, Berezhkov beside an airplane, and more and more airplanes with Berezhkov beside them. One of the photographs made him laugh. He turned round, showing me again his fresh clean-shaven face, his smiling lips and slits of narrowed eyes webbed round with humorous wrinkles. The photograph was of young Berezhkov standing next to an aerosleigh in a snowy field, wearing a fur-cap and a tightly belted sheepskin coat with a revolver strapped to the right side.

"A samovared sleigh. Designed by Berezhkov. Brilliant invention," he said with a comically dismal air. "Some day I'll tell you that sad story."

He was tossing the photographs aside one after another, but could not find the one he wanted to show me. I felt amused. Standing there with his back to me, Berezhkov could not, of course, see my sceptical little smile, yet his ears turned pink.

"You think I'm lying?" he said bluntly, swinging round to face me.

"It does sound rather incredible," I hedged.

To tell the truth, I was just teasing him in the hope that the spur of doubt would loose a flood of further argumentative detail—those precious grains of life it was my business, *ex officio*, to dig out.

"Incredible?" Berezhkov repeated. "It's marvellous! I tell you what?"

He glanced at the clock and went over to the open window. His gait was rather memorable. Despite a slight limp on his left foot, he walked with a surprisingly swift, light step, as though he were unaware of being lame.

It was a lovely May day outside. From up here, on the sixth floor of the aircraft department's new house, one had a bird's-eye view of the city's roofs. Painted with red lead according to an old-established custom of ours, with here and there a sprinkling of galvanized sheets, the roofs were tarnished and coated with the city's dust. Hot waves rose from their sun-warmed surface, and through the shimmering air the outlines of the building cranes above the new block of flats that was being erected on Sadovaya Ring nearby swam against a shining sky. The fresh brickwork blazed in the sun, and every gaping aperture and projection was rimmed in shadow, which gave it the effect of bulk. From Sadovaya Ring, which was hidden by the houses, came the incessant hooting of the motor traffic, but here, lost amid the maze of ancient Moscow's narrow winding streets, lay a peaceful old park with a pond all asparkle in the sunlight.

"I tell you what," Berezhkov repeated. "Would you like to see that fantastic wheel?"

"The actual wheel?"

"Yes."

"But how are we going to find it?"

"Leave that to me. Are you coming?"

"How are we going?"

"By motor-cycle."

I thought of Berezhkov's lame foot, and was on the point of putting my surprise into words, but pulled myself up with a muttered, "I'm. Is there a decent road?"

"The road's nothing. Berezhkov will cycle where no man will dare to walk. Come along!"

2

At that time—the date of my notes gives it as the year 1936—I was working in the "memoirs office." It was a queer and fascinating job. In the whole country only a few men, figuring in our staff lists under the vague name of "interviewer," could claim kinship with me in that line of journalism.

That small staff of "interviewers" worked under the auspices of Gorky, the "memoirs office" being one of the numerous literary undertakings sponsored by him. We were told to look out for interesting people, great and small, celebrated and obscure, and to get from them the stories of their lives. We were told to bring in shorthand notes and reports, it was to be a collection of human-interest documents, material for the historian and the writer; it was to be our job, our living.

One primary gift, or rather art, was demanded of the "interviewer"—that of listening. It was a gift of sympathy, of earnestness, and attentiveness. We had no written instructions. At one of our work conferences someone had read out a passage from *War and Peace*, and we had, of one accord, accepted this as a kind of "guide for the interviewer."

"Natasha, her head supported in her hand, and her face changing continually with the story, watched Pierre, never taking her eyes off him, and was in imagination passing through all he told her with him. Not only her eyes, but her exclamations and the brief questions she put showed Pierre that she understood from his words

just what he was trying to convey by them. It was evident that she understood, not only what he said, but also what he would have liked to say and could not express in words."

To be sure, in the course of time we worked out professional methods of our own. They were based on a warm interest towards the person who was confiding to us his story. Without this deep-felt interest the "interviewer" would have been a failure.

To continue the passage from *War and Peace*—

"Natasha, though herself unconscious of it, was all rapt attention, she did not lose one word, one quaver of the voice, one glance, one twitching in the facial muscles, one gesture of Pierre's. She caught the word before it was uttered and bore it straight to her open heart, divining the secret import of all Pierre's spiritual travail."

Here you have the secret of our work admirably expressed. It was our "going into the world" hand in hand with Gorky, as it were, for the aging writer was always an eager reader of the notes that we brought in.

It was these "memoirs-office" duties of mine that brought me into contact with Alexei Nikolayevich Berezhkov, the aircraft-engine designer, who was known at that time only to a comparatively small circle of aircraft industry workers.

At our very first meeting, after listening to him for half an hour or so, that sixth sense of an "interviewer" told me even before I had got to know the peculiarities of his mind and character, that here was a very talented man, and an excellent story-teller at that. And so I became a frequent guest of his and started "working" him like a digger who had struck a rich vein. I felt that he would yield splendid material for our collection of life stories.

We went down into the yard. Berezhkov's old war-horse of a motor-cycle stood spick and span in the shed. I had learned quite a number of amazing things about it while we were going downstairs.

Berezhkov slipped on a pair of gloves and swiftly and efficiently filled up with oil and gasoline. Screwing down the cap he said

"I made a record on this bike that nobody could beat."

"What was that?"

"I rode hands-off along a single tram rail all the way from the Bolshoi Theatre to Zubovsky Square with a pillion passenger and never once slipped off the rail."

"Hands-off?"

"Yes."

"You don't say so!"

"You don't believe me? I'll do it again if you like."

"No thanks," I said hastily

Berezhkov glanced at me with an odd smile. I didn't like the look of that smile at all.

He wheeled the motor-cycle out of the shed. The well-adjusted engine started smoothly and easily without any of the usual din and racket.

Berezhkov stood listening to the throb of the engine with a curious remote expression. I had met Berezhkov several times already and had noticed that look before. Usually somewhat cock-sure and excitable, inclined to boast and show off, Berezhkov at such moments would become a different man, aborn as it were of the tinsel and sham.

"A penny for your thoughts," I said.

"I was just listening to the engine. Jump on."

Berezhkov swung his leg over the motor-cycle and I settled myself into the pillion saddle. He slipped the engine into gear and we moved off smoothly.

And then, obviously taking revenge for my sceptical remarks, Berezhkov began the craziest of stunt-riding ever done in the narrow confines of a Moscow courtyard with brick walls on all sides. Without touching the handle-bars he circled round the yard, accelerating all the time. I expected him to crash at any moment into the corner of the house or run smack into the dustbin, but every time the careening motor-cycle missed the obstacle by what was nothing short of a miracle.

To my shame I must confess that I clutched at Berezhkov's shoulders. But he sat coolly in his seat with his arms folded on his chest. During the performance he turned round to look at me. The sight must have satisfied him, because he gave me a wink and shot out of the gate.

Several minutes later our panting motor-cycle was standing before the red light of the traffic signals on Mayakovsky Square among a huddle of leashed cars with idling engines, all waiting eagerly to spurt ahead the moment the green light gave them the road. In those days there was no concert hall building nor Metro station on the corner of the square. Nothing but a Metro shaft behind a blank wooden fence with the already familiar sign "M" over it. It looked as if they were working there on Sundays, too. Girls in tarpaulin jackets and trousers, unwieldy rubber waders and broad-brimmed wet miners' hats, all bespattered with fresh concrete, came running out chatting and laughing. They weaved their way adroitly among the waiting cars, and Berezhkov could not contain himself from waving his hand to them.

We rode on, making many a stop before the traffic control lights until at last we got out into the suburbs and swept out into the open country.

The motor-cycle streaked along, overtaking all the traffic ahead of us. Berezhkov couldn't bear the sight of any car in front of him and had to get ahead of it at all cost. The wind whistled in my ears and I was all but flung out of my seat over every pothole. I blessed the minute when no car was to be seen ahead of us and we could ease off to what seemed a less suicidal speed.

4

We had been travelling for over an hour, and after shooting across the bridge over the gleaming Oka and turning off the high-road, Berezhkov at last stopped the motor-cycle.

"It's somewhere round here," he said. "Yes, here's our platform."



I couldn't see any platform. We were standing by the railway track with the woods towering on either side, but nowhere did I see any buildings.

"Neat job that," Berezhkov said, kicking something on the ground.

Taking a good look I saw the cut of a thick post, blackened by fire, sawn off level with the ground. Nearby were other similar stumps—the remains of some platform.

"A historical spot," Berezhkov said, taking a look round. "I was here last in nineteen eighteen."

"As long ago as that?"

"Yes. The place is all overgrown, dammit!"

I followed his glance down the railway track and saw nothing but two walls of forest narrowing to a point in the distance. One side was bathed in sunshine, there, in the play of light and shadow, gleamed the resinous pines and the almost limpid greenery of the birches.

Berezhkov stood with folded arms admiring the scenery. But we had to get moving. Luckily, a human figure appeared on the footpath a little way off. Berezhkov spotted it at once.

"Come along," he said, swinging into the seat. "Must be some local."

It turned out to be an elderly peasant woman.

"Good day," Berezhkov said. "Do you live here?"

"Yes."

"Did you ever hear of a machine being built here a long, long time ago?"

"Not as I know of. I'm an illiterate woman, son."

"Well, isn't there something out of the common here in these woods? Some thumping big machine, you know, isn't there a great iron thingumbob standing by the river somewhere?"

"The go devil, you mean?"

"The what?"

"We call it the go devil."

Berezhkov burst out laughing, then turned to me with a triumphant shout. "What did I tell you? Neat definition! That, eh?"

In his extraordinary story that day Berezhkov, too, had used the word "go devil" for that colossus—a name which had been invented by the soldiers

On being questioned further the woman gave us directions for finding the path

"We'll find it all right!" Berezhkov said "Thanks, Ma."

"And thank you for a kind word And who might you be?"

"Berezhkov."

"Berezhkov? Never heard the name."

Berezhkov stood before her, tall and trim, in a light summer shirt and elegant tie. Just then a silvery airplane was passing high overhead. The hum of its engine reached us faintly. Berezhkov looked up, winked to me, and said to the woman, "Never heard the name, eh?"

We started off again. Berezhkov steered the motor-cycle carefully down a barely visible forest trail. Presently a large clearing overgrown with young trees showed through the trunks of the birches

"Here it is!" Berezhkov shouted

"Where?"

I could see no "go-devil." Years of immobility had blended it with the landscape, obliterating both the colour and the pattern of the metal structure. I looked for it as one does on a puzzle picture

Berezhkov parked his motor-cycle and strode across the clearing. I followed him, and suddenly, quite close at hand, I saw, sunk in the ground, two huge rusty wheels somewhat resembling the paddle wheels of a steamboat, and almost as high as the tree-tops. It looked like the hulk of some fantastic ship. I could make out a short wedge-shaped bow, like that of an icebreaker, and a rounded massive stern

A pace or two more, and I could touch the wheel with my hand. Flakes of reddish rust came away easily and crumbled between my fingers. Thick iron paddles could be seen only in the upper part of the wheels, those below being hidden in the undergrowth. The rear wheel was almost completely buried in the ground, and only a hard moss-grown bump marked the spot

Not a single nut was left on the "go-devil." It had been stripped clean of everything that was unscrewable and detachable.

5

Here is the story Berezhkov had told me before we set out on his motor cycle.

After taking a turn about the room to collect his thoughts, he had lifted a significant forefinger, and with a faintly humorous smile, had begun his narrative.

"The grand epopee I am going to tell you about," he said, "started like this one fine day in the autumn of nineteen fifteen Ganshin disappeared. Ganshin, you will remember, was my cousin, my coach in mathematics, my chum, and afterwards. . ." At this point Berezhkov broke off abruptly and exclaimed, "No! Cross that all out. That beginning is no good. Ganshin's disappearance will make the second chapter of our story. The first will be headed 'Ladoshnikov.' Did I tell you about Ladoshnikov last time? I didn't? Bad oversight that, dash it. But that's easily mended. I was a last year pupil at the *realtaya* school when I first met Ladoshnikov. As you know, I usually spent the summer holidays at Sergei Ganshin's place, or, to be more exact, I enjoyed the hospitality of my aunt, his mother, who was a schoolteacher in the Vladimir Gubernia, not far from Professor Zhukovsky's country-house. I've already told you something about Zhukovsky, haven't I?"

"Very little so far."

"Oh, one could go on talking about him for hours on end."

Berezhkov, smiling, glanced at a large photograph hanging on the wall. It was a full-length portrait of Nikolai Zhukovsky, a burly grey-bearded professor in a broad brimmed hat and jackboots, and with a double-barrelled gun and a dog—the father of Russian aeronautics, as he was called in the decree signed by Lenin. His eyes even on the photograph looked bright and sharp.

"When I first saw Zhukovsky, he was wearing a jet-black curly beard," Berezhkov said. "It's one of the ear-

Best and most vivid recollections of my childhood. It was like this—Sorry, we mustn't stray from the theme, though. But make a note of it, anyway: 'Professor Zhukovsky with a black beard' Remind me some other time, and I'll tell you about one of the most curious little scenes you can imagine. Now, where did I leave off?"

"You mentioned Ladoshnikov."

6

So I did, Berezhkov resumed. It was there, in the Vladimir Gubernia, that I first met him. He was a student, a member of the students' aeronautic circle at the Moscow School of Engineering, and was spending his summer holidays that year at the Zhukovsky's country place. Afterwards we learned that while living there, he had been working on his design of an airplane to be presented for his diploma. Two years later Ganshin and I were present when he defended that diploma dissertation, but then. . . Then we had seen Ladoshnikov only from a distance. You can imagine how interested we were in that student, knowing him to be a guest of Zhukovsky's and probably his favourite pupil.

Ladoshnikov used to stride about the fields all by himself, a lanky stooping figure in an embroidered linen shirt and high-boots, with a sort of permanent frown on his face.

One hot day in July or August Sergel and I were busy by the pond taking to pieces an outboard motor that we had bought together by pooling our resources. That small "Siam" motor served us for all kinds of experiments. We were for ever messing about with it, and we enjoyed this much more than we did the actual boating. I devised dozens of alterations, and was only kept in check by Sergel's cold caustic mind and our limited capital. For all that, I not only contrived new "Berezhkov-made" stud-bolts and splint-pins, but rearranged the ignition and introduced a very simple intake manifold of my own invention.

We had the boat out on the bank, and the disassembled motor parts lay before us on the stern. Suddenly, who should we see coming down the bank towards us but Ladoshnikov. He came up and stopped. Looked at the disassembled motor without saying a word. We tried to appear unconcerned but watched him with an anxious furtive eye. His puckered brows gave him a scowling air, and his deep set eyes under overhanging brows looked very small. Would he go away without having opened his mouth, we wondered? I could not think of anything to start a conversation, but Ladoshnikov broke the silence himself. He pointed to the mechanism I had invented and asked

"Who did that?"

I said nothing, of course, and just smiled modestly. Sergei announced me as the culprit. One word led to another; it turned out that Ladoshnikov had seen everything there was to see my new-fangled splint-pins and my new system of ignition. After a while he turned to me and asked.

"What's your name?"

"Alexei Berezhkov."

"I shouldn't be surprised, Alexei, if you invented an engine of your own some day."

"You bet I will!" I answered offhand.

"Perhaps you already know the kind of engine it is going to be?"

"I do. It's going to be a two-cycle engine with short cylinders. That's to reduce the stroke ratio. The counter-weights are going to be unique, too."

I expected Ladoshnikov to be struck all of a heap. The idea of this invention, which had captured my imagination when I was still in the sixth form at school, seemed to me to be terrific, revolutionary. But it was Ladoshnikov who was to astonish us. He picked up a long pin and a nut to match it out of the heap of metal parts, and with the use of these simple visual aids demonstrated to us the idea of the very engine which I had considered to be ultra-novel and unique.

"Is this the idea?" he said

"Yes but how do you know?"

"Looks as if you are not the only one who is pondering the problems of engineering progress. Other people go in for it, too, sometimes."

By revolving the pin and the nut he showed us some of the niceties of the problem, which, frankly speaking, had never occurred to me. Sergei and I listened to him open-mouthed. His voice rang stronger as he warmed to his subject. Do you know what else surprised me in him? His eyes. Blue-grey and gloomy, they had looked quite small before, but were now big, and clear.

"There, Alexei. Bear that in mind when you start on your engine."

"What about you? Why didn't you tackle this motor yourself?"

"I have my hands full enough as it is, my dear chap. I shall never get round to it."

Ladoshnikov dropped the steel parts, nodded to us and strode away. And that's how we got acquainted.

Two years later I did build a small boat engine of my own design on the lines we had discussed with Ladoshnikov that summer day on the bank of the pond. I told you about that little engine last time. D'you remember? But we're wandering from the subject again, I'm afraid.

## 7

Another scene always rises before my eyes when I think of young Ladoshnikov.

Picture to yourself the assembly hall of the Moscow School of Engineering. The spring of nineteen thirteen. Sunlight pouring in through the windows. The model of an airplane with canvas-covered wings on a tall stand. This was Ladoshnikov's plane named after him the LAD-1.

At that time the Ilya Muromets, a multi-engined flying machine on which Russian aviators had just set a number of world records, particularly for distance flight and load-carrying capacity, was being talked about a good

deal. The LAD-1 promised to beat the Ilya Muromets. The design was a daring one. Ladoshnikov's one-engined machine with a thirty-six metre wing span was, according to the project, faster than the Ilya Muromets and had a load-carrying capacity of two and a half tons against the latter's one and a half.

The hall was black with students' jackets. I was wearing one too. I was sitting next to Ganshin in the second row.

Ladoshnikov sat a little apart. His jacket had chalk smears on it. He had been defending his project here for three hours running, answering questions and criticism. Now he was waiting for the committee's verdict. His brows were drawn together, and his eyes, which had just had a challenging flash in them when he was fighting for his design at the blackboard, were downcast. The stick of chalk was still in his hand, his fingers squeezed it, crushing it; the white powder dropped on the floor and on the black leather of his boot.

The bell had just rung, announcing that the proceedings were to be resumed. All took their seats again to hear the committee's decision. Empty chairs stood around the green-topped table. In a moment or two the committee would file in.

I looked at Ladoshnikov, and could almost read his thoughts. Shortly before the interval one of the committee members, a well-known professor of applied mechanics and permanent consulting engineer of the Moscow "Dukes" plant where several airplanes had already been built, had said in the tone of a well-wisher:

"Are we not expecting too much of the candidate? Of course, such an airplane, supposing for a minute that it will be built, will never fly. But let us look at it from a different angle—let us take it as a student's design, the fantasy of a young man who is becoming an engineer."

The professor had gone on speaking, but Ladoshnikov had suddenly interrupted him.

"Why won't it fly?"

"We can go into that some other time, if you like. I am always at the service of young talent."

Ladoshnikov had listened to these words with a gloomy air. "It will never fly." The phrase must have been ringing in his ears all the time.

At last the committee came into the hall and took their seats round the table. Nikolai Zhukovsky, who was presiding, rose to his feet. I don't remember ever having seen him looking so solemn and impressive. Day in day out he had come to the lectures in the same baggy old suit. Everyone knew how Zhukovsky hated to dress up in uniform or frock-coat even on those occasions when he was expecting a visit from some personage of rank. That day, however, Zhukovsky had honoured the occasion—the completion of his pupil's long and arduous labours—by appearing in a long frock-coat. As he stood there bathed in sunshine, with the beams dancing in his thick white beard, this aged professor with the high dome-shaped forehead and dark piercing eyes, founder of the science of flying, looked really majestic.

"The Committee has unanimously decided," he said, "to confer upon Mikhail Mikhailovich Ladoshnikov a diploma of the first degree *cum laude*. As to whether his machine will ever fly . . ."

Zhukovsky did not finish the sentence. He was interrupted by handclapping. We were applauding Ladoshnikov, applauding his project, his pertinacity and success, applauding his instructor, our teacher Zhukovsky. The latter looked at Ladoshnikov, whose face was still wearing a frown, stepped out briskly from behind the table, and went over to his pupil with both hands extended. Ladoshnikov threw up his head with a jerk. Zhukovsky embraced him and kissed him. Instantly we sprang to our feet and crowded round them, cheering. We heard Zhukovsky say, "That boat of yours will fly, I'm sure it will!"

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Ladoshnikov, apparently, was too overwhelmed to say anything, but his eyes spoke for him. They had suddenly grown wide again and were sparkling.

And now, continued Berezhkov, we can pass on to the next chapter of our amazing epopee. Two and a half years have elapsed.

As I was saying, one day in the autumn of nineteen fifteen Ganshin suddenly disappeared.

The day before we had arranged that he would call for me in the morning to go together to a fire-bomb competition.

Such competitions were the vogue those days—during the first and second years of the war. But this was a special competition. An infernal machine devised by Alexei Berezhkov was to be demonstrated there. I had invented the thing in the summer out in the country—the same old place in the Vladimir Gubernia where Sergel and I were in the habit of spending our holidays.

I ought to tell you that by that time we were both full-fledged members of the students' aeronautic circle founded by Zhukovsky. Among our set of aviation enthusiasts Ganshin had the reputation of being a great mathematician. He swallowed treatises on mathematics like so many Sherlock Holmes thrillers and could talk integrals for hours. Zhukovsky gave him the stiffest calculations to do, and at the age of twenty-two, while still a student, Ganshin was in charge of the calculating office at Zhukovsky's aerodynamic laboratory. Well then, suddenly, at the most dramatic moment, on the day the competition for the best fire-bomb was being held, he goes and disappears. That bomb of mine created quite a sensation, and while celebrating my success that day I could not help feeling vaguely worried about Sergel. What could have become of him? I knew Ganshin too well to dismiss the matter lightly. That cold sceptic, who was constantly criticizing my fantasies with caustic irony, was a wonderful friend. What could have made him disappear on this of all days, which meant so much to me? What could have happened?

Ganshin did not turn up the next day either. And the following day, when I managed to find time to call at

his lodgings only to learn that he had not been home for three days, I had no doubts that something tragic had happened.

Who had seen him last? Who had he spoken to before disappearing? I believe Zhukovsky had sent for him. So off I ran to Zhukovsky.

"Nikolai Yegorovich," I said, "Ganshin is missing. Do you know where he can be?"

"Missing? Now, is he really? No, I don't know. ." he answered, keeping his eyes averted.

"You do know, Nikolai Yegorovich!"

Zhukovsky was a very bad liar, however. He looked acutely embarrassed and mystifying.

"Don't you worry, my dear boy," he said. "Your friend is safe and sound."

"But where is he?"

"I can't tell you."

I came away none the wiser, but Zhukovsky's mysterious manner puzzled me. What the devil was going on? What was the mystery about?

## 9

It wasn't until a fortnight later that I learned where Sergei had disappeared to. He called on me himself.

"Come along," he said.

"Where to?"

"To Engineer Podralsky."

"Who the devil's Podralsky?"

"All in good time."

"And where have you been?"

"You'll know that too in time."

His lean face with its slightly turned up nose and his eyes behind their glasses were inscrutable.

He bore me off, and within half an hour we were at our destination. I shall always remember that villa in Malaya Nikitskaya. The large plate-glass windows facing the street gleamed like mirrors, I noticed that although it was still daylight outdoors, the windows were closely drawn from inside with crimson velvet curtains. Ganshin

rang at the gate, and we were admitted into the courtyard, entering the house through the back door. In the hall someone asked my name and went off to announce me. Then I was invited in alone, without Sergel I was ushered into a vast brilliantly lit study, with two massive safes standing against the walls. The curtains that I had seen from the street hung over the windows in heavy folds.

A man of medium height in an immaculate blue suit got up leisurely from behind a desk and came forward to meet me. His black moustache was so exquisitely groomed that it looked velvety.

"Good afternoon. You are Berezhkov?"

"Yes."

"Alexei Nikolayevich?"

"Yes."

"You have designed a fire-bomb?"

"Yes."

He walked over to the door and turned the key in the lock. What's this, thought I. Where am I?

Then coming close up to me and looking at me searchingly, he made me swear that I would not breathe a word to any living soul about what I was going to hear.

"A single word to anybody, and you'll be court-martialed and shot in twenty-four hours."

"Shot?"

"Yes. In the event of a pardon being granted the sentence may be commuted to penal servitude for life. Sign this."

He handed me a paper on which all these dire penalties were set down in black and white. All agog with curiosity I signed it in a jiffy.

He folded the paper up neatly and locked it away in one of the safes. The lock clicked twice in the hushed silence of the room. Then he declared with solemn deliberation:

"This house is a secret military laboratory."

I looked at him in silence, waiting for further staggering secrets to come rolling out from under his velvety moustache.

"I am inviting you to work here," he went on "Will you be able to design a bomb-release mechanism with a sighting device?"

I was disappointed. A bomb-release? And that's all? I answered as I always did in my youth

"If I can't do it, nobody will!"

Podralsky's eyes went over me swiftly.

"No one must know where you are working," he announced. "You must be lost to the world."

That was my first meeting with Engineer Podralsky. I was taken on the staff of his secret laboratory the very same day in the capacity of junior designer at a monthly salary of eighty rubles.

10

"Did he tell you to disappear?" Ganshin asked me.

"He did."

"Never mind what he says, you live at home. It's just one of his fads. I swallowed the bait, too, at first."

We were strolling down Nikitsky Boulevard. It had been one of those remarkably fine, warm, sunny days you sometimes get in Moscow late in the autumn. Evening was drawing in, but the sun was still shining through the trees. Everything looked delightfully golden in its beams. I noted this as a happy omen.

When we were out of range of that hush-hush villa I gave Ganshin a theatricalized account of my interview with Podralsky.

"I wonder what's behind that bomb-release idea of his? What does he want it for?" I said.

"Didn't he tell you? It's for Ladoshnikov's plane."

I stopped in amazement.

"Ladoshnikov's? He's building Ladoshnikov's plane?"

Ganshin hustled me along.

"Don't shout it all over the boulevard. Yes. Believe it or not, but Podralsky has got his hands on that thing too. I happen to be working on it, making up a complete aerodynamic calculation of it. I'm living at Ladoshnikov's place. Come along and have a cup of tea with us."

Naturally, I needed no urging. In due course we arrived at Ladoshnikov's lodgings. He lived in a street off Ostozhenka. I was to be a frequent visitor at this two-storied log house in which the designer of the LAD-1 rented a room.

A rickety wooden staircase running up from the passage took us up to the first floor. Sergei knocked, and in response to a muttered "uh uh" opened the door.

Dusk was gathering, but the room, which at first glance looked very big, was not yet lighted. Two windows stared straight at the sky, which was aglow with the sunset. The figure of Ladoshnikov was silhouetted against one of the windows. He stood jacketless, the sleeves of his embroidered shirt rolled up.

"Wait a minute!" he shouted, and held up his outspread hand in a sharp gesture of warning.

We stopped.

"At his flies again, damn it!" Ganshin growled. "They've come to life with the warm weather, worse luck."

I couldn't make out what he was talking about at first. Who was at what flies? But presently I did hear a buzzing sound in the room. Looking closer I saw a very queer fly, which was going round in circles over a big table. On the table itself I saw several Leyden jars and an odd looking apparatus with a handle, a camera and the eye of a lense. Bending over the table, Ladoshnikov reached out his hand and touched something. On the instant a streak of lightning flashed in the room from the Leyden jars, which were discharged all at once.

I vividly recall Ladoshnikov's hand lit up by the flash as it lay on the table—a big work roughened hand with several small scars left over from cuts and bruises, a darkish skin pitted with metallic dust on the ball of the thumb, and wide short trimmed finger nails looking very hard and shiny.

"Aren't you tired of it?" Ganshin shouted when the cascade of electric sparks had died down.

The windows still glimmered bluishly, but after the blinding flash the room looked quite dark. Ganshin switched the light on.

The fly continued its oddly regular circling flight. Ladoshnikov caught it and placed it in the palm of his hand. Naturally, I went up at once to get a closer look at that freak of nature. Ladoshnikov explained, smiling, that flies and other small winged insects from gnats upwards served him for the study of aeronautics.

"I don't suppose, Alexei," he said, "that you even suspect that a field fly can work up a speed of up to nearly fifty miles an hour. This lady here comes very close to it."

I noticed that the fly's wings were glued to its body at a definite angle by two blowball hairs, and this it was what accounted for its odd circling flight. The queer apparatus on the table was a cine-camera designed and constructed by Ladoshnikov—a camera capable of making twenty-four snapshots during the brief flash of artificial lightning.

Ladoshnikov snipped the blowball hairs with a small scissors and restored to his captive its natural freedom of movement. His broad rough hands performed the operation with tenderness—no other word can describe it.

"Swap it!" Ganshin cried. "They have a nasty temper in the autumn and bite like mad."

"Never mind," said Ladoshnikov. "It's done a good job of work, let it live."

Opening the door, he let the fly out into the corridor, and after watching its flight for a moment, rejoined us.

Before long a simmering samovar was standing on the table where only a short while ago such remarkable experiments had been made. Ladoshnikov, acting the host, set out the glasses and brewed the tea. Ganshin told him about my visit to Podralsky and my new job. Naturally, I lost no chance to embellish the story with dramatic trimmings.

"One of these days I'll murder that fellow Podralsky," Ladoshnikov suddenly growled.



"Why, has he been at it again?" Sergel asked.

"He said he's going to stop building my plane."

"He's a damned liar," Ganshin said. "What is he ordering a bomb release for then? Besides, the engine has already been shipped."

"Shipped?" I queried.

"Yes. From America. A Hermes. Two hundred and fifty horse-power," Ganshin said.

"Oho!" I exclaimed.

In those days the two hundred and fifty horse power Hermes aircraft engine was considered the last word in engineering.

"Drat the fellow, I can't make out when he's lying and when he's not," Ladoshnikov continued. "Today he sent for me and said he was showing me his hand. There wasn't any money—not a penny, he said. He was up against it, he said, couldn't help himself. . . . And so on and so forth. The long and short of it was he demanded new ideas again. New ideas! Something sensational!"

"What about the aero-sleigh design? Isn't that enough for him?"

"It isn't. He wants something er—"

"Something stunning," I prompted.

"That's it. Something that will bring the money pouring in right away. Otherwise, I'm afraid he will really go smash, damn it all."

"I have an idea," I said modestly.

"What is it?"

"Chuckling the gear-box out of the motor-car. I think it's worth racking one's brains over."

"Our patron won't rise to that fly," said Ganshin. "Your gear-box isn't exciting enough."

I offered several more ideas, but none of them answered the peculiar circumstances of the case. Then, taking my opportunity, I asked a question, which, I might as well admit, interested me considerably.

"How does he pay for ideas? Excuse my curiosity, Ladoshnikov, but how much does he pay you for your airplane, for example?"

Ladoshnikov laughed.

"You don't know Podralsky, Alexei But it won't be long before you hear his pet phrase about 'future returns' Meanwhile . . . as you see, it's me who is doing the paying I'm paying with inventions Anything to keep him at the airplane."

11

As a matter of fact, I did get to know Podralsky better soon. All kinds of rumours as to his mysterious personality were rife among the laboratory personnel. He seemed to be all-powerful. The best houses in Moscow were open to him, he was a welcome guest in the drawing-room of the governor-general of Moscow, he was said to have breath-taking connections in St. Petersburg, to hobnob with the war minister and so on and so forth. We knew that he was visited and entertained by some of the great guns of the industrial world—Ryabushinsky, who was building a motor-car works in Moscow, Meshchersky, the owner of the Kolomna and Sormovo works, and others.

Podralsky always wore a dark-blue suit that had a brand-new look about it, he used the most expensive foreign perfumes, wore the neatest of trimmed moustaches, was always immaculately shaven and exquisitely groomed. He had a habit of giving a luscious roll to his words, and conveyed an impression of something wholly delicious and appetizing. We nicknamed him Pussycat.

As you will see further, this most charming of Pussycats had a wonderful flair for business. He rented a detached villa in Malaya Nikitskaya and, as I have already mentioned, rigged up a secret military research laboratory there. His was a very unorthodox manner of selecting the staff of that laboratory. Podralsky had a marvellous nose for talented inventors. He would hunt them out and take them on the staff of the laboratory, where they developed their own inventions. Everyone who brought in an interesting idea was offered a contract making ten per cent of future dividends payable to him for the idea, while the rest of the money went to Podralsky. But if you brought in not merely an idea but the thing itself,

that is, a constructed model complete with drawings and calculations worked out to the last detail, then prospective dividends under the contract were to be shared between the inventor and Podralsky on a fifty-fifty basis.

A lover of accurate definitions, Sergei Ganshin hit on an excellent motto for Podralsky's trade mark: "Others' Ideas Our Speciality." Our patron, of course, was happily ignorant of these caustic jokes, the laboratory employees always took care to treat him with respect, and there was nothing he liked so well as to have people pay respect to him.

One of the show pieces of our laboratory was a bachelor of Cambridge, a man with a huge spade-like beard. We called him *Beaver*. When generals and industrial big pots visited the laboratory, Podralsky would trot him out and introduce him by his full academic title, to which he gave a very juicy sort of articulation. Surprisingly enough that imposing bachelor went by the commonplace Russian name of Ovchinnikov and came from a family of Volga tradesmen. The bomb release idea was his, by the way (payable at the lowest rate of ten per cent on future returns).

Two rooms of the house were occupied by a machine shop, where wizards of the trade, past masters of mechanics, practised magic. Other rooms housed the design office, a chemical laboratory and the general office. The whole of this staff was employed on military inventions of the greatest secrecy.

One such invention was an explosive named "Izlit" after Podralsky's wife Yelizaveta. Its real inventor was Mamontov, a cranky old beggar of a chemist who was always terribly hard up.

Mamontov was one of the select few who possessed it and not just the bare idea—he had come in and laid the stuff on the table. In the laboratory it was kept hidden from the staff as well as from outsiders. It was not until after various events—of which I shall tell you in due course—that I saw that mysterious compound. It was perfectly white, and looked like powdered sugar or very fine tooth-powder. Its explosive force was really

tremendous for those days, much greater than that of guncotton

The stuff was originally called "moskovit," but somehow it got itself changed to "lizit." I think the chemist agreed to it because of sudden difficulties that arose, or maybe simply because it was made worth his while.

The trouble with the compound was that it proved to be rather unstable—it was likely to explode by itself after some time. It was expected that this objectionable feature would soon be eliminated. Meanwhile the rigging up of the heavy one-engined airplane LAD-1, capable of twenty-five hours' non-stop flying, was nearing completion in the service shed at Khodinka airfield. And then

Then, one fine day, a whole squadron of those planes would bomb up with "lizits," and swing out west. There, at the front, "lizit" would show itself.

All that was wanting, it seemed, was a minor detail—a bomb-release with a sighting device.

The idea of the bomb-sight, as I already mentioned, was Ovchinnikov's, the bearded bachelor's. The principle was undoubtedly interesting, but it was a devilishly hard job to get the thing to work. Both the author of the idea—the Cambridge man—and two or three design engineers employed at the hush-hush laboratory had tried without success.

One day Podralsky, annoyed and impatient, had said to Ganshin

"Do you know any decent inventor and designer?"

"I do. We have a prodigy at the aeronautic circle, a fellow named Berezhkov."

"Who's he?"

"A student."

"A student? Has he invented anything?"

Ganshin told him about me. After finishing the *realnaya* school in Nizhny Novgorod I had come to Moscow with an invention of my own—the petrol boat engine I have already mentioned.

By the autumn of nineteen fifteen I could boast also of two prizes won at two competitions. One was for a portable accumulator and the other for a fire-bomb.

The story lost nothing in Ganshin's telling, you may be sure. He knew that I never had a penny to bless myself with.

"Let's have him here!" Podralsky demanded.

So there you have the chain of circumstances that threw me in the way of Podralsky

12

Berezhkov, while talking, had been drawing something on a sheet of paper. He picked it up, looked at it admiringly, and handed it to me with a smile. It showed a sleek smiling cat sitting at a table and holding a spoon over a steaming plate. A table-napkin was tied round its neck with the ends sticking out stiffly.

"That's our Pussycat," he said. "He always tied a napkin round his neck that way when dining and purred with sheer ecstasy. But you should see the pictures of him in paint and pencil that my sister has made. I have them somewhere. Masha was a genius at doing him."

I had met my hero's sister, Maria. Being an artist (at the time Berezhkov had spoken of she studied at the Stroganov School of Technical Drawing in Moscow), her pictures of the founder of the hush-hush laboratory were no doubt more true to life, but her brother's expressive drawing was good enough for me. With his permission the drawing was attached to my notes. All of a sudden Berezhkov asked me.

"Did you ever read 'Tono-Bungay'?"

"No."

"That's a pity. Interesting novel, that. An American decides to invent something sensational, something that would go over with a terrific bang. Wandering aimlessly about the streets, he comes up against some half-obliterated writing on a fence somewhere on the outskirts of the town. Some of the letters are illegible, but the others make up a mysterious and fascinating word 'Tono-Bungay.' It sounds like music. The American goes home and orders ten thousand labels with the word 'Tono-Bungay,' then

pasted those labels on attractive bottles which he fills up with coloured water. And Tono-Bungay, the patent medicine, takes America by storm. The word flashes on the skyscrapers at night, and its fame is sung in music hall and saloon. Tono-Bungay was all the rage."

Podralsky's laboratory had its Tono-Bungays too, Berezhkov went on. About the only thing they didn't have a go at there was Aladdin's lamp. Podralsky raked in the money; as I said, big businessmen and military men visited the laboratory, and secret talks were held in the mysterious private office, but the affair always turned out to be a fizzle.

Take me, for instance. On the basis of Ganshin's calculations I knocked off a bomb-release mechanism in a matter of six weeks or so. The thing was done to a T. The pilot only had to sight the tube on the target, while all the calculations and drift corrections were done by the apparatus itself. A red light would then flash on automatically, at which the airman pressed a lever that jettisoned the bomb. It would have been a perfect thing but for one small defect: our bombs, for some reason, missed the target.

Lots of other inventions no less attractive were handled by Podralsky's laboratory. When one fizzled out, another'd pop up in its place.

During the early months of the war Podralsky jumped at the idea of the LAD-1 plane. And no wonder. Pussycat could flaunt the name of Zhukovsky, who had given the design his blessing. It was a design of the most high-powered airplane in the world. One that could lift a load of two and a half tons and stay up for twenty-five hours, that is to say, perform a non-stop bombing flight from Warsaw or Vilnius to Berlin and back again.

Yes, that was a thing you could get a subsidy on all right. And Podralsky, you may be sure, got it. As for the airplane, it was built not at a factory properly equipped for the purpose, but in a crazy, draughty old shed.

It was only through the sheer energy of Ladoshnikov that the assembling made any progress at all.

Podralsky's laboratory was always tottering on the brink, so to speak. Every two or three months found it in the grip of a desperate financial crisis, when it seemed as if Podralsky would go to the wall at last.

"Lizit," for one, was giving trouble. Pussycat, for ever optimistic, said it wanted just another little go to do the trick, but the days passed and no trick came off.

On such occasions Podralsky would get an attack of the blues, and stop paying all his bills, he didn't pay for the firewood, didn't pay the janitor, didn't pay the coachman, and ended up by going into hiding. His wife, Yelizaveta, whose name her fond spouse had decided to perpetuate, used to phone up several times a day, asking where her husband was. But no one could tell her.

And then, one fine day, he would turn up, his old cheery and purring self. The first thing he'd do would be to square all accounts. We knew what that meant: the current failure had been forgotten, something new and sensational had been found or invented, money had been advanced, Tono-Bungay was back again with a vengeance.

The early winter of nineteen fifteen found Pussycat in the grip of another acute financial crisis. It happened just when a red-letter day was drawing near—a day known to all the members of the laboratory staff. On the twenty-eighth of November every year Podralsky celebrated his birthday. By established tradition this day was considered a holiday in the laboratory. The employees were expected to pay their respects to the patron, who, as we have already mentioned, was extremely susceptible to all such signs of regard. On this occasion, however, a fortnight before the event, Podralsky had vanished into thin air.

Nevertheless, on November the twenty-eighth Ganshin and I went to pay him the usual visit of courtesy. Ladoshnikov refused to go with us. "The fewer such types were born into this world the happier it would be," he growled, and went off, as usual, to the air-shed, where the assembling of his plane was nearing completion.

Podralsky lived in Zamoskvorechiye, where he rented an eight-roomed house. Knowing that Pussycat had not been receiving anyone for some days, we intended to observe the proprieties by just signing our names in the visitors' book and withdraw with dignity. But things turned out quite differently.

"The master is expecting you," the maid said when we had announced ourselves.

She conducted us through the apartments.

"Here you are at last!" Podralsky exclaimed the moment we came into his study.

By that time Podralsky had taken the full measure of our gifts. We were the pillars of his laboratory. Ganshin had been made chief of the calculating office, while I had been promoted to head designer.

Podralsky snatched a silver bell off the desk and rang it.

"The third bell. The train is moving out," he announced with a solemn air of mystery.

The bell was answered by the maid who had let us in.

"I am not at home," Podralsky said in an imperious tone. "No visitors."

He watched the maid go out, then turned to me.

"Shut the door please, Alexei Nikolayevich."

I complied.

Podralsky looked round, then suddenly made a leap for the door with surprising agility and kicked it open. Having satisfied himself that there were no eavesdroppers, he turned the key in the lock and rejoined us.

Naturally, we forgot all about having come to congratulate him on his birthday, and waited curiously for what was coming. Podralsky dropped his voice mysteriously and said:

"What would you say about a wheel ten metres across?"

We looked at each other. Ten metres was the height of a three-storeyed house.

"Pretty big wheel," I said.

Pussycat smiled.

"What's it for?" Ganshin asked.

"That wheel is going to revolutionize history. That wheel will open all doors to us. It will be"—Podralsky



looked round again—"It will be a self-propelled cross-country fighting vehicle."

Podralsky, it appeared, had succeeded in fishing out a new stunning idea. Imagine two gigantic iron wheels—six or seven times the height of a man—coming down on you with crushing force. For comparison, imagine a wheelbarrow. It's usually pushed along a board. Try pushing it over a cobble-stone road. You'll find it very hard, because the small wheel won't skip cobbles. A car, on the other hand, moves easily over the road. Its wheel is seven hundred millimetres in diameter and it rolls freely over the stones and small potholes. A ten-metre wheel, now, would easily take trenches, barbed wire entanglements, fences and even farm buildings in its stride. The armoured cabin was to be equipped with machine-guns and cannons.

"Well, what do you say to that?" Podralsky exclaimed.

His voice shook. That grand master of black magic, I noticed, was awaiting the verdict of us callow youths with deep agitation. Before him stood two antipodes: a designer and an analyst, fantasy and calculation, enthusiasm and scepticism, yours truly and Sergel Ganshin.

"I think it's a smashing idea!" I exclaimed.

Upon my word, that wheel gripped my imagination at once. It doesn't take long to touch me off. I was already picturing to myself where I'd place the engine, how I'd arrange the transmission gear, and lower the centre of gravity by means of a massive rear roller. I could already see that amazing vehicle in my mind's eye, could hear the clank of it, could feel the earth shuddering under it.

Podralsky beamed when he heard my exclamation.

"Bear in mind," he continued, "that a wheel like that could ford rivers, too, up to five metres deep."

"Why only up to five metres?" I said. "Don't forget you could give it greater buoyancy by making it hollow. And paddles could be arranged round the tread. That would give us an amphibian."

"An amphibian?"

Podralsky jumped at it so eagerly that I could easily have claimed ten per cent for the idea there and then

"Of course—an amphibian!"

I could already see the thing afloat. The heavy rear roller, suspended in the water between the watertight housings of the two huge wheels, would ensure stability to the whole structure. No wave could upset it. Giving rein to my imagination, I poured this all out to Podralsky.

"That's right, yes," he repeated encouragingly. "On such amphibians, we could even force rivers like the Vistula, couldn't we?"

"The Vistula? Why not the Dardanelles?" I shouted. "Such amphibians could cross the Black Sea in a single night, land on the Turkish coast and seize the Dardanelles overland."

If you ask me, that absolutely clinched the argument in favour of the amphibian as far as Pussycat was concerned. He suddenly sprang up, seized my arms, and hissed "Sh! Don't shout about it, for Christ's sake!"

Naturally, I promised to keep silent.

"Let's call it the Dolphin," I suggested. "Or the Walrus. What do you say, Ganshin?"

"I think Canard would be the best," my friend answered scathingly. "May I ask, now, where you are going to get an engine for such an amphibian?"

Humph, the engine! That was a poser. You could invent a wheel a hundred metres across. If it came to that, but how were you going to make it move? For a tremendous machine like our amphibian one would need what for those days was a very powerful and at the same time light engine.

"I've got the engine!" Podralsky said.

"What engine?"

Podralsky whipped a telegram out of his pocket with the gesture of a conjurer.

"Kindly read that out, Alexei Nikolayevich," he said.

I read the telegram out. It said that four American two hundred and fifty horse-power Hermes engines had arrived in Vladivostok and had been shipped to Moscow by express train.

"Aren't those the engines for the LAD-1?" I asked  
"That's right," Podralsky said. "You can tell Ladoshnikor to take two of the engines straight from the railway station. As for the others. We'll use a Hermes engine for the amphibian, too."

He surveyed us triumphantly.

"Tomorrow you will start designing," he said, and added somewhat more vaguely, "we'll come to some arrangement about the dividends."

#### 14

When we left Podralsky, my ears were tingling. They always do when I am fired up.

Dammit, here was a machine the like of which the world had never known. Ever since I was a boy I had dreamt of becoming a designer and inventing things no one had ever thought of before, had dreamt of the great deeds I would do for my country's glory. And now, here it was!

My imagination ran wild. While thinking of the amphibian, of the self-propelled leviathan with ten-metre wheels, the like of which had never yet moved across the face of the earth, I was conscious of a multitude of purely technical difficulties. But the solutions of them flashed across my mind there and then, all excitingly clever and devilishly interesting, as they always are in a moment of inspiration.

"Wonderful!" I exclaimed, carried away by some new brain-wave.

Ganashin regarded me through his spectacles with his customary look of scepticism.

"What's your opinion?" I asked him uneasily.

"About you?"

"No, about this thing."

"A flight of fancy, nonsense."

"What do you mean, nonsense? Why?"

All the way home Ganashin scoffed at the idea of that wonder-wheel. The days of war chariots, he said, were long past. In modern warfare this gigantic amphibian was

bound to look ridiculous. The gigantic wheels would be visible from a distance both on the water and in the field, you couldn't creep up to an enemy unseen on such a huge machine, it would make an easy target for the artillery, which would smash it in no time.

However, I wasn't discouraged. I knew only too well that there wasn't an idea Ganshin had ever accepted without argument.

"Wait a minute!" I shouted. "You're forgetting about speed."

"What speed do you propose?" Ganshin said in the same mocking tone.

This was the chief stumbling block for the designer, but it was precisely here that I hoped to score a triumph even in the eyes of Ganshin, whom I had good reason for calling the greatest sceptic in the whole of Russia. In the few minutes since we had left Podraisky's house, I had conceived what I then thought to be a brilliant and perfectly original solution of the problem, and I started expounding it to Ganshin with enthusiasm.

We stopped at the familiar timbered house. Snow lay all around. Frozen washing hung on a line in the yard. This, and perhaps also the clean soft snow, gave off the peculiar smell of winter—that fresh, crisp, thrilling tang I loved so much. Well, you can imagine how I felt.

I snatched up a stick from the ground and started making drawings in the snow. But Ganshin was not impressed. He repeated his question.

"But what speed do you propose?"

"What speed? My solution makes it possible to choose any speed you like. Fifty, eighty, a hundred kilometres an hour! Imagine that leviathan coming down on you with a terrific clatter at a speed of a hundred kilometres an hour."

"Maybe your heated imagination is keeping you warm," said Ganshin, "but I'm freezing. Come in and have some tea. I'll read you something about the laws of structural strength from the course of physics while we're at it."

Up in his room he went about making the tea in a leisurely manner while I followed him about the room, down

the passage, into the kitchen and back again, arguing with him, at once furlous with him and eager to have his criticism.

Then, as good as his word, he took a book of physics off the shelf found the formulas he wanted, and coolly proved that the extraordinary size of the construction sharply reduced its strength and that at a great speed the gigantic wheel would inevitably crack up and fall to pieces at the first impact with some compound section.

Soberly and clearly Ganshin pronounced his death sentence. But I stood my ground. It wasn't sheer cussedness on my part, though. Some unerring instinct, the hunch of a designer, told me that the amphibian would go.

I must confess that this instinct had let me down on more than one occasion, especially in my young days, I'd persist in constructing impossible things only to drop them afterwards as technical delusions, and it wasn't until years later, when I became more experienced, that I learned to put a curb on these hunches of mine.

The new amazing machine had taken a strong hold on my imagination and I was carried away by my newborn conception of it. You'd be surprised how irresistible the desire is in such cases to see the first movement, to hear the first sound of the friction drive. For us builders of machines that moment is one of supreme gratification and delight.

It's a curious thing, mind you. It wasn't as if I had invented this tremendous amphibian myself, yet I was so captivated by it you'd think the idea was one of my own hatching.

That's the way it is with us designers. I hardly ever call myself an inventor when I speak seriously. Usually designer. To work up an idea, to find its expression in metal, to make a thing of it, and get it going—that was the breath of life to me, the joy of creative work.

We argued. I used up a pile of paper, making sectional drawings of the amphibian that graphically illustrated the new ideas as they flashed across my mind, but Sergei Ganshin, my constant friend and blittest opponent, my

calculator, without whom I was doomed, as a designer, to grope in the dark—Sergel Ganshin, I say, stood firm.

Nevertheless, I still kept at him. There had been many an occasion during our friendship when, after laughing an invention of mine to scorn, Ganshin had eventually succumbed to my enthusiasm, and had been won over to it. I told him that later on, in the process of designing, when the brain would be sharpened up by its tussle with thousands of difficulties, we would discover, we were bound to discover, solutions of the strength problem that now eluded us.

"Imagine," I coaxed him, "imagine a press report 'Brilliant victory. Our armoured amphibians' surprise capture of the Dardanelles.'"

But Ganshin just waved his hand with annoyance. Feeling myself on the wrong track I changed my ground.

"Listen, how does this sound 'Miracle of engineering. Creation of two Russian students.'"

"No, we shan't come into the picture at all. It'll be Podralsky from first to last."

"Granted! But the machine will be *our* creation! D'you mean to say you and I won't go through with it?"

I suggested that we get going the very next day. Ganshin was to first give a general calculation for the thickness of the paddles, the tread and the axles, and estimate the weight of the whole thing.

"Why not?" I said. "Let's tackle the job and get it done."

"No," said Ganshin. "It's fantastic. Crazy. A crack-brained scheme."

"All right!" I shouted. "Let's wait till Ladoshnikov comes. We'll hear what he has to say about it."

"All right," Ganshin said, and smiled mockingly.

Ladoshnikov came in the evening. Apparently, he had spent the whole day supervising the assembly of the airplane. His face nipped red by the frost, he brought in with him a medley of work smells—that of glue, machine

oil, kerosene, and acetone. A whiff of that bouquet was enough to conjure up a picture of the plane in the service shed where things had already reached the painting stage and dope proofing.

Ladoshnikov scowled, nodded, and threw out in a growly tone

"Ah, Berezikov! Glad to see you."

He was habitually anything but talkative. Perhaps that was why his every word of greeting or kindly glance gladdened me so.

"The Hermes engines have arrived, Mikhail Mikhailovich," I said eagerly.

The news galvanized him. He had been waiting for it such a long time. His face paled with excitement. That most thrilling and terrifying moment a designer can experience was now close upon him—that moment of agonizing suspense when his plane would undergo its first test.

We all remembered, of course, the ill-omened prophecy uttered in the school's assembly hall two and a half years ago "It will never fly." Those words must have haunted Ladoshnikov and caused him no little suffering, but he was not the man to confide personal experiences of that kind to anyone.

He was silent for a while. He went over to his bed and took his towel. At last he broke the silence.

"Arrived, you say? In Moscow?"

"No, Vladivostok," I answered. "But they've already been shipped to Moscow by express. Podrasky told me to tell you you could take two engines straight from the station."

Ladoshnikov started wiping his hands on the towel, forgetting that he had not washed them yet. One would think he had to go off to the station immediately.

"Take them right away?" he queried. "How kind of him! I wonder what's come over him? He must have dropped into a good thing."

"You bet he has!" I said. "In my opinion it's—"

"Perhaps you'll wait," Ganshin interrupted, "and give a man a chance to wash himself after work."

Ladoshnikov looked at the soiled towel, laughed and went out into the kitchen. He came back in a clean embroidered Russian blouse, his wet hair brushed back from his forehead. I could tell at once that he was in a very good humour. His moods were always reflected in his eyes. Usually hidden, they were now wide open. I liked their colour—at one moment dark-grey, at others, when excited or happy, an intense blue. Just then they were blue.

"Well, Berezhkov," he began, "what new mine has Pusycat sprung on you today?"

"Mikhail Mikhailovich," I said, "Sergel and I have nearly come to blows here. We've been arguing all day about some ultra-fantastic thing—"

"Ultra bosh," Ganshin inserted calmly.

"We'll put it to him now!" I said. Going up to Ladoshnikov and imitating Podraisky's mysterious manner, I went on, "Mikhail Mikhailovich, what would you say about a wheel—"

Ladoshnikov did not let me finish the sentence.

"A wheel? Ten metres across?"

"So you know about it! Did he tell you?"

"I sold him that wheel myself."

"You?" Ganshin cried. "Then why didn't you tell me about it before?"

"I've been feeding him so many of these ideas that. . . So he's jumped at that wheel idea? Good. That'll shake him off at last."

"What's more, you'll be getting ten per cent on future dividends for the idea," I said.

"Thanks. For that ten per cent he'll worry the life out of me, and hold my nose to the grindstone. I have no desire to mess about with that thing. I'm busy enough as it is. To hell with his dividends! A designer should be free!"

Of course he should. At any other time I would have heartily endorsed that tremendous sentiment, but just then I could think of nothing but that wheel.

"Do you think it will work, Mikhail Mikhailovich?"

"Why shouldn't it? It'll work splendidly. The thing to bear in mind is. . ."



Dispensing with pencil and paper, Ladoshnikov, by the aid of his ten fingers alone, illustrated with surprising clarity the scheme of his construction.

"Mikhail Mikhailovich, what if . . ."—my voice was husky with excitement—"what about turning it into an amphibian? You see, we could make the wheels hollow. And the rear roller would be freely suspended in the water. What do you think—is that possible?"

"Certainly, Alexei. Splendid! And if the thing's too heavy you can give it extra floats."

"Fine!" I exclaimed. "We might even use them as diving tanks."

"Oho! You want the amphibian to sail under water too, I see!"

"Why not! We'll take on water ballast and submerge."

"Not everything at once, Alexei. Don't be carried away."

And so Ladoshnikov approved the idea of the amphibian, although he put a certain curb on my imagination. I exulted, and the worried Ganshin promised to make the calculations.

Coming home that evening, I opened my diary, to which I confided cherished maxims and thoughts, and made the following entry: "A designer must be free." (Ladoshnikov.) Under that came the date—November the twenty-eighth nineteen hundred and fifteen.

16

Another fortnight passed. The Hermes engines had arrived in Moscow in the luggage van of the Trans-Siberian Express, and two of them had been delivered to Ladoshnikov's air-shed at the Khodinka. And then, at last, came the memorable day of the plane's first trial run.

Try to imagine the picture. A huge flaming sun rising over the open airfield which is wrapped in a frost-mist. The LAD-1, set on runners, has already been brought out. Its unusually long, tapering, dark-green wings are moored to the ground hooks. The engine, running idle at different speeds, is already roaring.

Once, over two years ago, I was struck by the model of this airplane which stood in a corner of the assembly hall where Ladoshnikov had defended his project, and now again, looking at the actual full-size machine, I thought it a striking spectacle.

Even here, in the vast snowy field, where any sort of structure would have looked dwarfed and insignificant, Ladoshnikov's airplane was very impressive. Its strongly built undercarriage was taller than a man. You could pass freely under the hull, or the fuselage as we call it. In those days it was hard to believe that that gigantic, powerful machine could be lifted by a single engine. But the plane's forms were so smooth and rounded, or, to use a modern term, streamlined, that it sometimes looked like a creation of nature itself.

Ladoshnikov was the first man in the history of aviation to give attention to over-all streamlining, which other designers did not start doing until at least ten years later. To make a long story short, the LAD-1 resembled a modern high-speed monoplane. Today you would find it nothing out of the ordinary. But that was just its most striking feature.

Naturally, Podraisky was at the airfield, too. He came with an American engineer, a Mr. Vale, who had delivered the Hermes engines in Moscow. The latter was a tall, extremely genial and effusive man with a tendency towards corpulence. Podraisky introduced him. Mr. Vale raised his soft hat with a beaming smile, revealing a none too tidy head of fiery red hair. Although it was winter, the freckles still showed on his round face, giving him an ingenuous air. He strung phrases together in broken Russian without the slightest embarrassment. He was already on intimate terms with Podraisky, with whom he strolled about arm in arm.

They made towards Ladoshnikov, who, in a short jacket and top-boots, was standing next to the plane with his fur-cap jammed down on his forehead and his hands behind his back. At their approach his scowl deepened. Podraisky halted, stopped the American, took another look, thought better of it, and turned back. Obviously,

out almost his whole library, laying out the codes of laws on the carpet and building all kinds of barriers with them, then began water tests in an indoor marble pool, laughing and enjoying himself immensely

After that visit a grant, or, as Podralsky termed it, a royal bounty of a million rubles was made towards the construction of the amphibian. A million! You should have heard the way Pussycat rolled that word over on his tongue!

We had it all worked out, complete with drawings and calculations, and could now go ahead building. But where? Above all, there had to be a shroud of mystery about the thing. Without the mystery there was no glamour, the thing lost half its spectacular effect. And the spectacular, as you know, was Podralsky's motto.

Well then, all of a sudden Podralsky disappears again. There is plenty of money, the bills are paid regularly, contractors and tradesmen are amiable itself—yet Podralsky has vanished into thin air. One day passes, then another, a third, then a fourth, but there is no sign of him. At last, on the expiration of six days, he turns up again, as bland and pink as ever with the same velvety black moustache.

"What's the matter?" I asked him.

"Sh. Not a sound. Come into my office."

In his private office a strange spectacle met my gaze. One corner was cluttered up with rolls of paper. Some of them lay spread open on the desk and on the sofas. These proved to be sheets of half-inch-to-one-verst maps issued by the General Staff.

Podralsky locked the door and announced

"I've found it!"

"Found what?"

"A place for the Grampus."

"The Grampus?"

That was the cryptic name which on Podralsky's orders we now used for our amphibian. The grampus, as you probably know, is a member of the whale family.

"Yes!" Podralsky said "We are going to build it in a wild wood "

It appears that Podralsky, who had been so busy lately that he could not spare a moment to visit Ladoshnikov in his air-shed, had spent over a week driving along the banks of rivers outside Moscow, looking for a place that was absolutely safe from prying eyes. The next day he took me and Ganshin down to the spot he had selected. At first we travelled by motor-car, then, at some village or other, we got into a wide country sledge. With no little difficulty we reached a clearing in a dense wild forest on the banks of the Oka.

"This is where we're going to build it!" Podralsky declared.

Before long a field-engineer company was working there. Hundreds of trees were cut down to widen the clearing. They built incredibly damp dugouts and huts out of drenching wet pine logs for the engineer troops who had been assigned to the job of building the amphibian.

The area was fenced off with barbed wire, and guards were posted at intervals of from one hundred to two hundred paces.

"Some day there'll be a town here. The town of Podralsky," Pussycat once declared, smacking his lips with relish.

However, we called the place Wood Glen. We had the exclusive use of a railway engine and two coaches in which we made trips between Wood Glen and Moscow. A platform was run up at the railway track at a point nearest to Wood Glen, where freight-cars with materials were unloaded. Soldiers were on duty at the neighbouring stations. They got into every train and stood the passengers up with their backs to the windows so that no one should see the packing cases on the platform.

In a word, everything possible was done to make every Tom, Dick and Harry aware of the existence of the mysterious Grampus. This had its compensations, though a halo of secrecy shone far and wide around Wood Glen. Tono-Bungay was back in all its splendour.

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Meanwhile Ladoshnikov

But I think I had better describe first what happened one evening in February in the year nineteen hundred and sixteen.

I was sitting at home. The door flew open.

"Alasha, you!"

My sister, in ankle-boots and coat, burst into the room straight from the street. She was the last person I expected to see that evening. Since she had married the artist, Stanislav Galitsky, a classmate of hers at the Stroganov School, I didn't see much of her at my diggings. Courtesy now required that I should visit the family hearth of the newlyweds myself and swallow "nourishing home-made dinners" there.

Masha plumped down on my bed, gasping for breath. One would have expected greater dignity of conduct from a married woman.

"What's the matter?"

"I've just met Ladoshnikov. He's dead drunk."

"Ladoshnikov? You must be mistaken!"

"He's been fighting in the street."

"Fighting? That can't be him then."

"What do you mean it can't be him? He spoke to me. Alexei, you must go at once and find him."

When she had sufficiently recovered her breath Masha gave me a more or less coherent account of what had happened. Going down Neglinnaya, she had seen a crowd of people on the pavement. She was about to cross the road when she suddenly saw the head of Ladoshnikov in a fur-cap pulled low down over his forehead towering above the crowd. He was shouting and seemed to be the central figure in some street scene. My sister, of course, ran up to him at once. He was gripping a gentleman with a black little moustache, dressed in an expensive fur-coat, by the scruff of his neck.

"D'you know, Alexei, I could have sworn that that man was Podralsky," my sister said. "He was just as sleek and plump. But it wasn't him. Ladoshnikov was

shouting, 'I'll beat you to a jelly! Making a fortune out of the war, you scoundrell' I don't know what it was all about, but the crowd's sympathy was obviously on Ladoshnikov's side. Then we heard the police whistles I took Ladoshnikov by the arm and led him away quickly."

"Where is he, then?"

"If I only knew He went quietly enough Kept on talking about what a wonderful sister you had, Alexei "

"Ladoshnikov as chatty as all that?"

"Yes, he was ever so talkative. Then suddenly it struck me that he was dead drunk. I wanted to bring him here but he wrenched himself free and went away "

"How could you have let him go?"

"Don't be silly What could I do with a man of his size?"

I started dressing quickly Clearly, someone had to go in search of Ladoshnikov He must be feeling pretty bad if he had taken to drinking

"Don't you think perhaps that rumour we heard was true, Alexei?" Masha said.

I nodded My sister and I understood each other very well, and I had no secrets from her Could it be that Ladoshnikov had yielded to despair and given up? And where could he have gone to? Where was I to look for him?

I went off at once to see Sergel

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Luckily Sergel was at home. The news about Ladoshnikov being drunk did not seem to impress him much

"For one thing, you and I are not his keepers," Ganshin said "Secondly, nothing will happen to him. He's had drinking bouts before this, and was never any the worse for them."

"Drinking bouts? When?"

"Why, don't you know? He's had them almost since he was sixteen. It's quite a story, old chap "



In reply to my eager questions, Ganshin told me the following. Ladoshnikov was a puny, sickly youngster. His foolish mother often bewailed him and drove it into his head that he was a "poor" little "weakling." His stepfather—a tailor in one of Moscow's poor districts—disliked the child. And so Mikhail Ladoshnikov grew up a shy sullen boy, who although undeniably gifted, always suffered from a morbid sense of inferiority. One day—the day he graduated from the *realnaya* school, I believe—he was piled with vodka till he got drunk. All of a sudden he started shouting at his stepfather and shook his fist at him. He could hardly believe his own eyes when he saw his stepfather recoil from him with a face white and scared.

Then came the painful awakening. Ladoshnikov shrank into himself still more and grew gloomier than ever. And from then onwards he started resorting once in a while to the cup that cheers. He drank hard if not often.

It wasn't until years later that his work with Zhukovsky and his work on the construction of the LAD-1 seemed to have almost cured him. And now came this relapse.

"We've got to find him," I said. "It would be mean to leave him in the lurch at such a moment."

And I proceeded to set before him the ideas and hunches I had formed as to Ladoshnikov's trouble. Ganshin listened, puffing at his pipe. Then he said:

"I recalculated that thing of his the other day. It's all right. The plane should fly. I can see only one reason for failure."

"What is it? Out with it!"

"The engine."

"What about it?"

"I'm afraid it doesn't come up to its advertised performance. The firm's catalogue claims too much for it."

"Oh, that's a bit thick, Ganshin. This is America, don't forget!"

"What if it is? Haven't they got Pussycats of their own there?"

That set me thinking. It sounds incredible these days, but at that time, in the year nineteen hundred and sixteen, the Hermes engines were actually taken delivery of just on faith, without being tested for power output. Once the firm's catalogue listed it at "250 h.p.," this was held to be gospel truth. Naturally, we gave the engines a run, and I took one of them to pieces and reassembled it with my own hands for the mere sake of satisfying my curiosity as a designer. I was too busy then to make a more thorough study of the engine on the test stand, which was available at Zhukovsky's laboratory. I put it off for some other time. As you know, I was completely absorbed in the wheel those days.

"Hell!" I exclaimed. "D'you really think so?"

"I'm certain of it," Ganshin said. "I'm sure the Hermes doesn't come up to scratch. That's where the trouble lies. We'll have to give it a check-out tomorrow."

"Come along then! Let's go and find Ladoshnikov at once!"

Ganshin dressed, grumbling, and we went out.

## 20

I won't mention all the places we went to in our search for Ladoshnikov. We eventually tracked him down to the lodgings of Panteleimon Gusin, the aero-sleigh inventor, who was a friend of his. Ladoshnikov had blundered in there after his meeting with Masha, and not finding Gusin at home, had dived back again into the nocturnal sea of Moscow.

Fagged out, we ran him down at last at about two or three in the morning in a cabmen's night teashop somewhere on the edge of the town near Brest Railway Station.

I particularly remember the dense mist the whole place was filled with. Clouds of frost smoke rushed in every time the door was opened. The blurred electric lights looked like big pale smudges.

Freezing cold and tired, Ganshin and I flopped into a couple of chairs at Ladoshnikov's table. He wasn't

the least surprised to see us, and made no comment whatever. You'd think it was quite a normal thing for us to come tumbling in there at that unearthly hour.

His face, which was unusually pale, bore no trace of gloom or sullenness. He looked gay, if anything. He was in the company of two cabbies in long blue coats. Our arrival interrupted what was evidently a lively conversation.

There was a savoury smell of fried sausage in the tea-shop. I sniffed the air hungrily. It smelt of vodka too. Vodka was not allowed to be sold during the war. Here, as in other similar catering establishments, it was illicitly served up in big, white china teapots that were supposed to contain boiling water. The smaller teapots that were always served together with the big ones contained the brewed tea.

Ladoshnikov looked into the big teapot and shouted into the mist for more glasses.

Ganshin fell to wiping his spectacles, eager to start the conversation. He had already forgotten the way he had grumbled and groaned when I dragged him out into the cold to start our search. He got quite excited, on the way, at the prospect of springing this glad surprise on Ladoshnikov. He was smiling in anticipation, and his eyes narrowed short-sightedly. Ladoshnikov moved the teapot up to him. Ganshin said:

"Look here! I believe I've hit on the reason why your plane."

Ladoshnikov looked up quickly and scowled. His hand flew up in a forbidding gesture. I noticed again what a rough big-boned hand it was. Its fingers, blackened with oil and metallic dust, were those of a constructor, a workman.

"Drop that!" he shouted.

"Wait a minute! Did it ever occur to you that no one has checked the engine for performance?"

But his words obviously fell flat. Ladoshnikov smacked the wet oilcloth, intimating, as it were, that the subject of his airplane was taboo. But Ganshin wouldn't take the hint, and I had to check his ardour.

Ladoshnikov filled the glasses. We tossed them off. After that we had a few more, and followed them down with hot sausage straight from the frying-pan.

I began to feel hot and sleepy. The mist floating about the teashop, and the blurry lights swimming in one's eyes now seemed very pleasant. Ganshin, poor devil, was all in, too, but he was off again on the same subject. Through a nodding drowsiness I could hear "Hermes engine," "catalogue," "advertized power rating." Then his voice trailed off to a mumble.

That meeting in the teashop ended in a most unexpected way. Ladoshnikov always laughed when he recalled it. He assured us that he got sober the moment we got sozzled. When he did begin to understand at last what Ganshin was trying to tell him, we were too far gone for intelligible conversation. The two friends who had come dashing in to save a comrade in distress, were themselves reduced to a state of maudlin helplessness.

Ladoshnikov had to take us home to his lodgings in a cab.

21

Ganshin had been right. The Hermes firm's ads had claimed more for their aircraft engine than it was capable of doing. Its performance fell short of specification by ten to twelve per cent.

We found that out at the aerodynamic laboratory of the Moscow School of Engineering. The whole laboratory, as I believe I already mentioned, was housed in a single large room provided by the school council. The members of the aeronautic circle had made all the equipment themselves. In one corner there towered what we called the rotary machine, somewhat resembling a gymnastic giant stride, which was used for air-screw investigations. This machine was invented and constructed by one of Zhukovsky's pupils, a gifted aircraft designer named Savin, who, unfortunately, died young. The room also contained two wind tunnels—one round, a metre in diameter, the other square, or, as we called it, flat—

both knocked together out of ordinary boards Ladoshnikov had designed those tunnels (under the direction of Zhukovsky of course), and then, armed with the tools of a fitter and a carpenter, had rigged them up with the aid of two or three comrades.

I believe I mentioned already that one of Ladoshnikov's characteristic traits was a passion for experimenting. Year in year out, for instance, with amazing persistence he studied the flight of flies and dragon-flies with the aid of a miniature apparatus of his own construction.

He came in for a good deal of banter on account of these experiments and one of his friends called him Fly-King but. If you knew Ladoshnikov, you'd know that he wasn't one to be trifled with.

He treated everything that he did very seriously. He blew the model of his LAD-1 through the wind tunnels times without number.

With his face pressed against the glass of the watch window in the wall of the tunnel he would study the behaviour of the model in the rushing air-flow for hours on end. But these observations did not satisfy him. He hit on an idea which is being used in all the aerodynamic laboratories of the world to this day. He pasted very fine untwisted silk threads over the wings, the fuselage and the tail of the wind tunnel model. This gave visibility, as it were, to the air-flow, to all the eddying motions and breakaways, and provided a picture of the streamline flow.

Thus the streamlining of the airplane, by which Ladoshnikov, one might say, anticipated the future of aviation, was not only an amazing discovery on the part of the designer, but also. No let's put it this way: this amazing discovery was the result of long, hard and persistent effort.

But we're wandering from the theme again. Crammed into a corner of the large but overcrowded room in which Zhukovsky's laboratory was housed, was a stand for testing aircraft engines. That, too, we had built ourselves in the school's workshop. Cheap and simple though it was—like most of the equipment in this engine corner

of ours—it was nevertheless sufficiently accurate. By that time quite a school in the art of testing and measuring had grown up in that laboratory. Three students—now leading aircraft engineers—devoted themselves to what we had thought to be of little interest or importance—namely, to the laboratory equipment, the testing and measuring appliances.

It was these appliances that showed us that the Hermes did not come up to scratch.

Ganshin could not forgive himself for having accepted the firm's catalogue unquestioningly. He, who had never taken anything on faith, to be misled like that! Ladoshnikov said nothing. What could he say? Hard words would not improve the engine's performance. I wonder, though? Whenever I was in a fix, I always hoped to the last that something unexpected would happen to save the situation.

"I wonder if we haven't overlooked something," I said. "Some special fuel mixture, say. Or some method of hopping it up. Let's send for the firm's man. The American knows his engine better than we do. You can never tell! After all, it's a well-known American house."

"Yes, we know it well enough now," Ganshin threw in sarcastically.

"But we can always hold them down to the terms of the contract, can't we? Let's take it up with Podralsky. We'd better hurry up and tell him all about it, by the way."

I was on the point of rushing off to my place of employment—the hush-hush villa in Malaya Nikitskaya—but Ladoshnikov's loud laugh checked me. It was just like him. He seldom took part in our conversations, but was apt to burst out laughing without warning and to throw in some stinging remark.

"Go on, Berezhkov, run along and seek sympathy," he said. "Don't forget Pussycat has never cheated anyone in all his born days. I bet you he can't even imagine such a thing. Will his tender feelings bear the shock?"

Podralsky bore the shock manfully. At first he was naturally alarmed.

"What about the Grampus?" he said. "Will it drive the Grampus?"

All that worried Podralsky was the fantastic amphibian. He had staked his all on this card.

"It will," he reassured himself. "If the worst comes to the worst, I have my eye on something that. . . But hush, not a word yet."

And not a word more did he tell me about that mysterious "something." His little eyes narrowed and a look of unconcealed pleasure crept into his round pink face. I watched the metamorphosis with amazement.

"As a matter of fact it's a jolly good thing!" he continued.

"What is?"

Podralsky leaned over to me as though confiding a tremendous secret, and whispered:

"That I haven't yet paid the Hermes firm for the engines."

He stepped back and surveyed me with the air of a man who was now fully persuaded that he was a genius. I hazarded nevertheless:

"And what about the LAD-1?"

Pussycat might not have heard me for all the notice he took of what I said.

"Will you please give the Hermes another test tomorrow, Berezhkov. I'll bring Mr. Vale along with me."

"Yes, do. He may be able to give us more information. Some secret or whim of the motor we haven't been able to put our finger on."

"Possibly, possibly," Podralsky purred.

The American turned up looking as cheerful as can be. He did not seem to be in the least put out by the complaint against his firm's goods. With flaming hair, and

broad freckled nose, a round little paunch showing from under his open jacket, he came into the laboratory, passed his eye round with frank curiosity and greeted us with a genial shout

Ladoshnikov, scowling, barely nodded his head Ganshin and I acknowledged his greeting rather coldly too

Unperturbed by this reception, Mr Vale coolly proceeded to inspect the laboratory, went up to the rotary machine, expressed his approval, gave the planking of the round wind tunnel a patronizing pat, went over to the engine test stand, around which all four Hermes aircraft engines had been collected, looked at the instrument panel and said again approvingly, "Oh, a Russian apparatus! Good. Very good!"

Podralsky, who was watching him, amiably volunteered various explanations, although he had no authority whatever to do so We stood by in silence. Any outsider would have taken them for a couple of jolly good fellows I daresay I would have taken their winning smiles at their face value, too, had I not known what lay beneath the surface.

We fastened the engine down on the stand and began the test. All the indices, as on previous occasions, proved to be less than what the firm's catalogue had promised. This catalogue, printed on stiff glossy paper, suddenly materialized in Podralsky's hands. He always seemed to be producing things like this out of his sleeve or from the air, like a conjurer. He put on one of his most fetching smiles.

"Well, yes," he murmured, showing the catalogue. "Not quite the thing, you know."

The red-haired American laughed. Evidently he was ready to parry the attack. He tapped the panel containing the measuring instruments and said, "Russian apparatus!" Then he shook his head vigorously, intimating that he, a representative of American engineering, could not rely on our device. I had not realized till that moment why the man's whole attitude had roused in me that vague sense of resentment. His very affability and ease had a patently slighting quality in it.



"Oh, this apparatus is not to be relied on," the American continued

Podralsky's smile became somewhat strained. Did he, too, resent the American's tone, I wondered. Not he! Podralsky conformed to type. The only thing that worried him was that Vale might upset his plans.

But before Pussycat could utter a word, Ladoshnikov stepped in. He went close up to the American, and looking him squarely in the face, demanded in clear crisp English, "Is that all you have to say?"

Rawboned strong and tall—towering above the burly American—Ladoshnikov was a grim figure. As designer of the airplane he was demanding an answer from the firm, who had failed to fulfil its obligations. Vale looked somewhat startled. Was he afraid that that lanky Russian would hit him? Without another word Ladoshnikov turned sharply on his heel and went out.

Vale started after him. The American understood only too well that it was in the interests of his firm to settle the matter amicably. Quarrelling with a customer? A row? Heaven forbid!

Gesticulating vigorously, profuse in his apologies, Vale all but dragged the resisting Ladoshnikov dragging him back into the laboratory.

Mixing English and Russian, Vale was saying: "Mister Ladoshnikov, please, sit down. I understand you. I quite understand your feelings as a designer. I'll do everything I can for you, Mister Ladoshnikov. Of course, a deviation of several per cent one way or the other is quite possible."

"Unfortunately, the deviation with you runs only one way," Ladoshnikov growled.

"We'll find something to suit you. I give you my word, Mister Ladoshnikov. We'll write to my firm this very day, if you want."

"That's it," Podralsky chimed in, seizing his opportunity. "We'll write them today for sure."

Having thus pounced with all four paws on Vale's promise, which the latter had let fall in an unguarded moment, Podralsky became his old beaming self again.

ring, he tucked Vale's arm in his own, took genital  
ve of us, winked, and bore the American off.  
No three were left in the laboratory. What had we  
ieved? The American had divulged no secrets, had told  
nothing. The Hermes engine was still on the stand,  
ind-new, gleaming with aluminium and steel. Not a  
op of oil escaped from the valves or trickled down its  
very body. It was a beauty, I must say. Nothing but a  
ghly developed industry could produce a thing like that  
nd you, it was quite a conventional type of engine—  
thing original in the way of design ideas. Its designer  
d just used and lined up the established "knowns" of  
gine building in the various countries—but the firm's  
ump-card, without a doubt, was its technology of mass  
oduction.

Very well then—the Americans had stretched the truth  
bit. But where were we to get another motor? Where  
re we to find a more powerful engine? Aircraft engines  
re not being built in Russia. That meant we had to  
our hopes on the same old Hermes firm again. Vale  
uld write them, his letter would cross the ocean, they'd  
ip new engines to us from America, these engines  
uld cross seas infested with German U-boats. Sup-  
sing the higher powered engines did arrive (which was  
remely doubtful). But when would we get them? In  
c months at the earliest. Did we have to wait all that  
ne? Couldn't something be done?

I realized then that it was no use expecting some come-  
And yet . . . And yet I still hoped against hope.

## 24

I'll tell you about another meeting with Ladoshnikov  
anishin had moved into other lodgings by then.

I might add that I used to drop in on Ganshin for a  
p of coffee every morning on my way to work. We  
lled them our coffee mornings. Our being on the staff  
the laboratory made us feel quite opulent, and we could  
ten afford to miss a meal in the cheap students' can-  
en. Ganshin made excellent coffee, which was served

up with delicious crisp brown rolls, hot from the baker's. We drank coffee and talked shop—mathematics, mechanics and aerodynamics. My brain swarmed as usual with fantastic engineering projects, and I propounded them enthusiastically to Ganshin by the dozen, while he coolly examined them in the light of physics' inexorable laws.

We had our bit of fun, too. Once I brought home with me from the hush hush laboratory a glass tube a metre long and about as thick as my small finger. We used it as a sort of blow-pipe. We'd make a little paper cone, stick down the edges by licking them, and fix a steel nib to its pointed end. The cone was then inserted in the glass tube, and one of us—the head designer or the chief of the calculation office—would start blowing with all his might. The paper cone would slide down the tube, flattened out against the sides, then, in accordance with the laws of aerodynamics, shoot out in the shape of a terrible lethal dart. Our favourite targets were crows—many of which met an untimely death under Ganshin's window. We were very keen on bringing down a sparrow, but try as we might, taking it in turns, we never succeeded in hitting one. We called this pastime the morning hunt.

Well, on one such morning, there was a knock on Ganshin's door. What with the excitement of the hunt and the noise from outside, I did not hear it. I remember standing on a stool at the open little ventilation window, taking aim with the shooter. Ganshin pulled my trouser-leg warningly. I turned and saw Ladoshnikov standing in the doorway. To cover up my confusion I began explaining things with a jaunty air. I showed Ladoshnikov our blow-pipe and the paper cones, and offered to give him an exhibition of my skill. And all of a sudden I met his odd quelling glance. He was looking at me coldly and resentfully from under his beetling tufted brows. That look went right through me, seared my very soul. Indeed, here was Ladoshnikov, his airplane locked up in a freezing cold ramshackle airshed at Khodinka, forgotten by everyone, with no one to taxi it down the runway, no one trying any more to lift it in the air; and its creator, its de-

signer, well-nigh broken-hearted, comes to see us, and finds me. That resentful, hostile look haunts me to this day

Ladoshnikov told us that Zhukovsky had asked him to read a course of lectures on aerodynamics to army airmen. He had come to Ganshin for certain materials for the lecture "Calculation of an Airplane." Naturally, Ganshin bestirred himself collecting the materials for him. Ganshin kept his papers in perfect order and could lay his hand quickly on whatever he wanted. He picked up a writing-book in black cloth covers, and paused irresolutely. I knew why. It was the book containing the complete aerodynamic calculation for the LAD-1. The sight of it would cause Ladoshnikov further pain, of course. After a moment's hesitation, Ganshin put it in with the batch of materials he had set aside for him.

None of us, however, said a word about the LAD-1 plane. I wanted to break that deliberate and oppressive conspiracy of silence, to start speaking about the airplane, but I was at a loss for words.

I felt miserably helpless. "It will never fly!" Again that ominous prophecy rang in my ears.

Ladoshnikov did not stay long. He took the papers and went away, gloomier than ever.

## 26

Fortune seemed suddenly to turn her back on Pussycat. Do you remember how quickly he had set his mind at ease about the amphibian when the Hermes turned out to be below par? "Oh, we'll think of something!" he had said vaguely. It appears, that just to be on the safe side, he already had an eye on another engine for the amphibian—the German Meibach of two hundred and sixty to two hundred and seventy horse-power, which had fallen into our hands as spoils of war off a Zeppelin that had crashed behind our lines. Podralsky was confident he would get that engine for our Grampus. But he didn't. The Meibach slipped through his fingers—it was assigned to the new Russian airship. No other

Meibach, of course, was obtainable while the war was on.

This was followed by another unexpected blow. The Naval Ministry, which had endorsed our project, stipulated that the armour plate was to be much thicker than we had originally planned. That meant an extra seventy thousand pounds to the weight of our machine. Ganshin carefully recalculated the whole construction.

Then one morning he broke the news to me. His calculations showed that the Hermes engine would not pull the overweighted amphibian. It wouldn't pull it even if the firm did supply an engine that came up to specification. Consequently, the diameter of the wheel would have to be reduced to seven metres, or

"Or what?" I shouted.

Ganshin shrugged his shoulders.

"Or we'll have to use an engine of three hundred horsepower."

Three hundred? In those days, as far as we knew, no one in this country or abroad had designed a petrol engine of such capacity.

Podralsky would not hear of reducing the size of the wheel.

"Ten metres, and not a millimetre less!" he cried. "Ten metres, or everything is lost!"

What exactly he meant by "everything" he did not explain. Frankly speaking, I can't make it out to this day. Even a seven-metre wheel would have been formidable enough. But Podralsky's exclamations, his frantic whisper, were hypnotizing. I walked about Moscow spellbound by the words. "Ten metres, or everything is lost!"

Every morning Ganshin and I discussed the situation from all possible angles. Podralsky looked blacker every day.

But one morning, while Sergel and I were drinking coffee and harping on the same old string, my ears suddenly began to tingle.

"I've got it!" I shouted. "The Grampus will go!"

Ganshin looked at me in a puzzled way.

"You think the Hermes will do it after all?"

"The Hermes be damned! I've got a brain-wave! The Grampus will go! And the LAD-1 will fly! We'll have our engine!"

"What engine? What are you talking about?"

"A new engine! A Russian engine! A three hundred h.p. engine!"

26

Berezhkov was silent for a minute or so. His ears had turned pink, as if still tingling with the memory of that far-off day. Smiling, he lifted a significant forefinger.

"This," he continued, "is where the boat engine of my youth comes into the picture. Remember me telling you about it? You remember—springtime, the river, my friends on the bank—among them my sweetheart—I crank up, the engine starts with a noise that is like music, *I stand by the rudder, the boat moves off, propelled by my own motor, and those on the bank cheer and wave their hands.*"

"Yes, Alexei Nikolayevich, I've got all that."

Many of the adventures of the young designer were already described in the notes of my previous conversations with him, which I had carried in triumph to Gorky's "memoirs office."

"It's all on record," I repeated.

"Interesting?"

"Very. I'm dying to hear more. So you shouted, 'We'll have our engine!' What did Ganshin say?"

"Sergei?" Berezhkov queried. "I don't have to tell you that his mocking face expressed anything but enthusiasm."

Knowing by experience that he was in for one of my usual fantasies, related with tremendous gusto, Ganshin settled himself comfortably in his armchair and eyed me narrowly as if I were a queer sort of animal or something. It must have sounded funny, too. Here I was talking about a three hundred h.p. engine when the Germans

most up-to-date engine for the Zeppelins gave only up to two hundred and sixty at the outside limit, and the Americans' Hermes couldn't squeeze out its advertised two hundred and fifty.

But the design of the new engine leapt out clear and vivid before my mind's eye in a flash of inspiration. That's a peculiarity of mine which I have retained to this day. I saw the thing in imagination, as it were. In such cases I am prepared to argue myself into a fit.

"You wait!" I said, jumping up. "I'll be back in half an hour."

I rushed out, hailed the first cab I came across, and within half an hour was back again, dragging my little boat engine into the room.

Only then, after examining the actual construction, did Ganshin at last begin to show signs of interest.

He was still full of doubts, however. Nor were they all of a technical nature. Suddenly the philosopher in him woke up.

"Very well, we'll build this engine, say. But what for?"

"What do you mean what for? Don't you know?"

"Will people be any the happier for this engine of yours?"

"Oh, what a blister you are!"

But he repeated doggedly:

"Will people be any the happier? What's the use of building your engine?"

Ganshin would get that way sometimes when the mood was on him. Listening to him, you'd think it wasn't worth while working or living.

"First of all," I said, "we'll give Ladoshnikov an engine. That's to say, we'll prove that the LAD-1 can fly. Imagine the sensation. Young Russian designers build the best plane and the best engine in the world. . ."

"What of it? What for?"

"For conquering the skies! For developing aviation! For Russia!"

"I don't know about Russia. . . In whose hands are you going to place this thing of yours? Pussycat will grab hold of it sure enough."

Of course, Ladoshnikov in my place would have growled, "Such rotters won't always boss the show in this country." But I took little interest in politics and the revolution, and considered my sphere to be only techniques and engineering. In our philosophical disputes, when we had them, Ganshin nearly always chased me up a tree with his sceptical syllogisms. Now, according to his logic, my future engine would merely strengthen tsarist despotism. I wonder! In the end I always dodged the issue by beating a retreat and crawling back into my shell.

"To hell with philosophy!" I shouted. "I don't care a hang about all that. What I want is to build my engine, an engine the likes of which the world has not yet seen."

After philosophizing to his heart's content and establishing beyond a shadow of doubt that life was utterly meaningless, Ganshin deigned to descend to more earthly levels and take notice of my boat engine.

"The idea's an interesting one," he said, "but we won't be able to handle it on our own."

"Why not? I made a small engine, didn't I?"

"Here you just fittid things together, but there you'll have to work it all out. And it's all so vague, so new . . ."

"You're a funny chap! That's just the thing! That's why we'll beat all the engines in the world."

"I'm afraid we'll only succeed in making ourselves look foolish."

He enumerated the mass of baffling problems and difficulties that would beset us in the designing of such an aircraft engine. The calculations, he said, would be terribly complicated. He'd never tackle the mathematical analysis of such a construction. Nor would anybody else for that matter, unless it was Zhukovsky.

"Zhukovsky? I'll go and see him."

"You've got some nerve, you have. Fancy bothering a man like that with such trifles."

"Trifles?" I yelled.

Ganshin, however, soon climbed down from his sceptical perch.



The white heat of my enthusiasm warmed him up. An hour later—by the way, we suddenly discovered by then that it was time to switch on the light, that the day had passed, and that the hush-hush laboratory had managed without us that day—found me drawing at Ganshin's table and discussing the various design details of a three hundred h.p. aircraft engine. I stayed the night with my friend, but I couldn't sleep, and woke him up several times to listen, sleepy-eyed and grumbling, to some new brain-wave of mine. Towards the morning a name for the engine occurred to me, and I woke my friend up again on the instant.

"Ganshin! Ganshin! Wake up! I've got a name for the engine."

"Leave me alone."

"How does it strike you? You just listen."

Ganshin made as if to stop his ears, but I went on:

"The Adros. The initial letters of 'Aviatsionni Dvigatel Rossiya'\*. How does it sound?"

"Go to sleep will you! No Adros exists yet and I don't suppose it ever will."

"It will! You said yourself that we'd have to go and see Zhukovsky, didn't you?"

"Oh, all right, all right. Only let me get some sleep, for God's sake."

"I won't! Tell me how you like the name."

27

Berezhkov was so carried away that he stamped his foot, as if it was not me, but that exasperating Ganshin sitting there in front of him.

He was standing under the portrait of his teacher—the grey-bearded burly professor in the jackboots and wide-brimmed hat. I was anxious to hear more about Zhukovsky. At the mention of his name I said,

"I have a note here. 'Zhukovsky with a black beard.' You told me to remind you about it."

\* Meaning "Russia Aircraft Engine."—Tr

"So I did!" Berezhkov exclaimed.

He looked pleased, if anything. It was characteristic of Berezhkov, the story-teller, that he did not like a straight connected narrative and would often jump from one subject to another.

"Yes!" he exclaimed. "I must tell you about that. You can arrange it in proper order afterwards. As I told you, my father used to send me out to the country every summer to live with the Ganshins. I went there with my sister, who mothered me from early childhood. The Ganshins' place was near that of the Zhukovskys." Professor Zhukovsky always spent the summer there, and his house was open to all the children of the neighbourhood. My earliest memories of him are linked with this Orekhovo country-house of his and the Orekhovo pond. In this vivid picture, which must have impinged itself strongly upon my mind from the age of four or five, I clearly see Zhukovsky with a black beard. I remember the sunshine, the somewhat turbid warm water of the pond, the slippery and rather terrifying bottom. We small fry were splashing and tumbling about near the bank. All of a sudden a man in a loose duck jacket and duck trousers appeared on the dam. He was a big man with a slight paunch and a black curly beard like a gypsy's. He shouted to us:

"Hi, children! That's not the way to bathe. Look here!"

He slipped his clothes off quickly, and with a running start jumped into the water at a tremendous bound, feet foremost. He came up snorting, then with upraised arms swam right across the pond, or rather trod the water with his body upright, snorting, growling, and squirting fountains of water from his mouth. I stared spellbound at that miracle of technique, that freak of nature.

That scene—the sunny day, the bottle-green sheet of water, the weeping willows with thick bared roots showing here and there where the bank was washed away, and farther out a gigantic elm—that scene, I say, still lives in my memory; it's like a flash of childhood caught in a splinter of mirror.

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For many years, as a boy and later as a young man, I had lived close to Zhukovsky for months at a time. His was a well-regulated life. Out in the country he got up regularly at nine and had his tea about half an hour later. Then he went into the garden and sat there for a long time "sun-dialling," as we called it. There was a sun-dial in the garden, which he had made himself, and a bench next to it. There Zhukovsky would sit. I often watched him on the sly, curious to know what he did out there. But he did nothing. He just rested his arms on the back of the seat like this, and sat gazing out into the distance. His dog Izorka was nearly always with him, lying at his feet. Swinging his leg mechanically, he'd touch her with his toe, and mutter, "Izorka, Izorka, you nasty little beast."

Izorka would prick up her ears, but her master just went on staring out into space.

I realize now that "sun-dialling" was just Zhukovsky's way of letting his mind run free.

He'd sit there woolgathering for an hour or so, then go indoors for his *boorka*. This was a black and very old Caucasian felt cloak with immensely wide shoulders that stood out stiffly. He'd take that *boorka*, a packet of white paper and an ink-pot—one of those ordinary cheap ink bottles with a very narrow neck and a plain cork. I had known Zhukovsky for twenty odd years, and had never seen him use any other. With this square little ink-pot and a thin round school pen, and his *boorka* thrown over his shoulders, he'd go out into the garden accompanied by the invariable Izorka. It was one of the loveliest old linden gardens you have ever seen, covering about eight acres. Zhukovsky had a favourite birch tree there. He'd spread the *boorka* on the grass under the birch-tree and make himself comfortable on it, lying there for hours on his stomach or on his side and writing his endless formulas. This occupation of his, in fact, was referred to as "the Professor is writing his formulas."

I saw those sheets covered with his writing. Except for a phrase or two here and there, there was hardly any

text—just a solid mass of formulas. He had a large sprawling handwriting, and the lines often sloped downwards.

At six Zhukovsky dined, and after that he always had a nap. He slept for two hours, then had his tea and sat down to his "formulas" again.

This was a daily routine. Yet Zhukovsky was a lusty-living person, who was not afraid to let himself go.

It was enough, say, for a shepherd to come and report that a wolf had appeared in the neighbourhood and killed and carried off a lamb, for a wolf-hunt expedition to be set on foot immediately under the leadership of Zhukovsky. The Professor was a very keen huntsman. A sabre hung in his room—the "major's sabre" it was called. What major, why major—nobody knew. Zhukovsky had inherited that sabre from someone or other together with the Caucasian *boorka*. When going out to hunt wolves, he'd always take the sabre with him as well as his gun. On such occasions he'd turn out in the queerest sporting costume you'd ever seen: an old uniform jacket from the days of his youth, which he had grown out of years ago, a once black but now faded rust-coloured felt hat, jackboots reaching above the knee, and the same old *boorka*. He felt fine in this outfit, though.

Keen and ardent huntsman though he was, Professor Zhukovsky seldom camped out at night. He always preferred to sleep at home, so that he could get up as usual at nine, have his tea, and go out "sun-dialling."

## 28

In Moscow Professor Zhukovsky lived in a small, very warm house in Milnikov Pereulok—a quiet little back street. The house was always full of guests. The appointments of the rooms, the furniture, the domestic routine—all was quaint and old-fashioned. The housekeeping was done by Petrovna, an old woman who lived to be ninety and remembered Zhukovsky's family almost as far back as his great-grandmother. Zhukovsky had a daughter

Lenochka At the time I speak of, that's to say, when we were students, she was a girl of sixteen or seventeen.

A jolly young crowd, pupils of Professor Zhukovsky with their brothers and sisters, often used to gather there in the evenings. We students, unpampered by good living and eating, expanded in the warmth of that cozy, hospitable home. The low little rooms resounded with our games, dancing and music. And amid all this gaiety and hubbub Zhukovsky worked unperturbed in his room.

He'd come out for supper—grey-bearded, fat, and genial—and liked to act the convivial host. Sometimes, after supper, he'd play forfeits with us, and enjoy it so much that he'd sit up for hours. More often, though, he'd go woolgathering, and retire to his room directly after supper.

Day in, day out, at ten in the morning, he was to be seen coming out of the house in his invariable wide-brimmed hat and professorial cloak—a garment which nobody wears these days—and taking a cab. The cabbies of the neighbourhood knew him, and knew his never-changing route—from the house to the Moscow School of Engineering. He lectured there and made his experiments in the aerodynamic laboratory. He came home for dinner, and never missed his two hours' sleep after it. Then he'd get up and sit down to his writing-desk.

His going to the theatre was an event the whole household prepared for three days in advance and were excited over for three days afterwards. He liked sometimes to go to Testov's eating-house, which was famous for its *blini*\*, but that was only on the rare occasions when he was invited there by some professor crony of his.

I am convinced that the "formulas"—that is, his work—was Zhukovsky's only real passion.

One day I asked him,

"Nikolai Yegorovich, how do you manage to write so much? I couldn't keep it up for an hour."

He smiled.

\* *Blini*—a Russian pancake.—Tr

"Everyone likes to do what he enjoys doing"

So he enjoyed doing it. I smiled understandingly by way of reply, but Zhukovsky's eyes, faded but keen, became grave

"It's my duty above all," he said

## 29

Zhukovsky's scientific discoveries you will find described in books. I'd like to mention one trait of his as a scientist.

His career, from the outset, ran in haphazard sort of zigzags and swerves that puzzled anyone who did not know the man

The subject of his thesis for his M.S. degree was "The Kinematics of Fluids". His next work was entitled "Motion of Solids Having Cavities Filled With Heterogeneous True Liquid". He was a classic example, it would seem, of the learned recluse, preordained for the life scientific.

What you have to bear in mind, however, is Zhukovsky's character, his lively nature, his marvellous knack of switching his mind over to the different problems that clamoured for attention, his capacity for throwing himself wholeheartedly and enthusiastically into whatever he did.

For instance, in the days of his youth bicycles were still a novelty. The bicycle which he used to pedal all over Orekhovo instantly attracted him as a problem of theoretical mechanics. He was all agog, as the saying goes. Day after day he made calculations on sheets of paper, figuring how the spokes and wheel rim worked, writing formula after formula giving a mathematical analysis of the bicycle. The result was a short article by him entitled "On the Strength of the Bicycle Wheel". The bicycle wheel calculation made by Zhukovsky is the first and only one in the world. Zhukovsky exhausted the subject.

Or take another example.

Zhukovsky, the young professor of theoretical mechanics, author of researches on the kinematics of fluids and



on solids with cavities filled with liquid, researches in which pure theory predominates, was once asked to give his advice on the water mains, the ordinary urban water-piping of Moscow. This piping had just been laid and put into operation, but some curse seemed to have been upon it from the very start in the shape of mysterious fractures. And our theorist, our armchair scientist, absorbed in his formulas, tackled the water mains, and not just any old way as a boring nuisance, mind you, but with all the verve and zest characteristic of him. As always, he brought all his vital powers to bear on the problem. He had a special water pipe built on the surface of the ground to investigate the baffling problem of pipe fracture, which he induced by rapid shutting off. He started writing his formulas again, using up hundreds, maybe thousands of sheets of paper. The result was his famous solution of the hydraulic impact problem. This research brought him world fame before he ever took up aeromechanics.

And do you know how Zhukovsky came to interest himself in aviation? As a matter of fact he never liked to fly. Only once, early in the nineties, did he go up in a balloon at the Paris World Exhibition and got badly airsick. But there, at the exhibition, Zhukovsky saw the model of a glider. Flights had already been made at that time, but the theory of aeronautics, the theory of heavier-than-air craft did not exist yet.

What is flight? What are its laws? What are the theoretical principles of the airplane? Zhukovsky put those questions to himself, and was all agog again. The thing gripped his imagination and did not let go to the end of his life. He went on writing his "formulas" in Milnskov Pereulok and at Orekhovo, giving mathematical expression to the airplane, and in a short while he gave the world his classical solution of the wing lift problem. Aeronautics is tremendously indebted to Zhukovsky. He was the first to throw light on the formerly puzzling phenomena, identified with the idea of "flying." A new science appeared—

that of aerodynamics Zhukovsky was its founder, its leading spirit and its greatest exponent, the head of the Russian school

30

The evening after my dispute with Ganshin I came into Professor Zhukovsky's study with a small drawing under my arm.

"Nikolai Yegorovich," I said, "can you spare a minute? I want to show you something."

"Certainly. Shan't be long! Sit down."

It was Zhukovsky's usual "formula-writing" hour. Sheets of paper covered with his sprawling handwriting lay not only on the top of his desk, but on the ash-tray, on a stack of books and on the window-sill. Even the antique clock on his desk was buried under sheets of paper. Two or three of them had been deposited on the threadbare rug at his feet.

He was sitting in his slippers and an old dressing jacket. The hot stove gave off a pleasant warmth.

He went on writing for a time. The thin pen-holder in his massive wrinkled hand moved swiftly across the paper. He did not mind my presence at all. His large lips stirred slightly under his grey moustache. He stopped writing for a moment, glanced down at his feet, leaned his heavy body over the arm of his chair, and, with a low grunt, picked up a sheet of paper. Then his pen flew on again. It seemed to me that a pleased smile flitted across his face.

"Nikolai Yegorovich," I began again.

"Just a minute, Alexei."

Then, with his eye still on the unfinished page, he leaned back, sighed and turned to me. His kind faded eyes regarded me absently.

"What is it?" he said gently. "Some new idea?"

"Yes," I answered, my voice hoarse with excitement. "I'm going to show it to you, but not a word to anyone, I beg you."

"Come, come, don't frighten me. I'm up to my neck in secrets as it is."

In those days Zhukovsky was constantly being called in to give expert advice on questions of military aviation, and the aerodynamic laboratory set up by him was handling, among other things, military assignments I might mention in passing that Podralsky had managed to worm himself in here, too. Zhukovsky's researches in the flight of shells and bombs, as one can easily establish by his list of works, date from this period too.

I unrolled the drawing. The first draft of the Adros engine lay spread on Zhukovsky's desk.

Knowing Zhukovsky's kindness, I had always, since a boy, confided my ideas to him. I would put a thing down on paper at Orekhovo and take it to him. Never as long as he lived did Zhukovsky lose the faculty of being surprised. When examining my childish projects, he'd usually make a clicking noise with his tongue expressing surprise. Then he'd say, "It's interesting, you know, Alexei. Very interesting." Or else, "This is a bit doubtful, I should say. I'm afraid it won't do." Then a fascinating talk would begin.

While explaining the idea of the engine to Zhukovsky I waited tremulously to hear whether he'd say "Interesting" or "It won't do."

"Interesting, very interesting!" he said. "Leave this with me till tomorrow, will you? I'd like to think it out."

I could tell by his eyes, however, that he was not interested. He looked at me kindly but absently, his thoughts obviously elsewhere.

"Leave it with me till tomorrow," he repeated.

There was a pleading note in his voice. He seemed to be asking me what he couldn't bring himself to say outright, "Please, do me a favour, don't bother me just now."

But passion, I need not tell you, is inexorable, and the passion of a designer doubly so. Catching the hint of delicate request in his voice, I followed up my attack without hesitation.

"It isn't just a dream project, Nikolai Yegorovich. I know a businessman who will take it up. Podralsky will take the thing for his amphibian."

"What? For what?"

The question escaped him despite himself, but his eyes still had that pleading look in them which seemed to say, "Spare me this!" No, Nikolai Yegorovich, I can't spare you!

"Why, don't you know? But this is a strict secret, Nikolai Yegorovich. I'll be condemned to penal servitude for life if — You see, there is an invention —"

I sketched the amphibian with the ten-metre wheels on a sheet of paper, and tried to give the most blood-curdling description of the havoc this monster would play among the enemy.

"Interesting," Zhukovsky said apathetically.

"We have no engine as yet for this go-devil. The Hermes is a bit too weak. But I'll design my engine so that its over-all size will do for both the amphibian and Ladoshnikov's airplane."

"Ladoshnikov's airplane?"

Zhukovsky stared at me, then picked up my drawing from the desk and began to examine it, holding it at arm's length from his far-sighted eyes. I hastened to explain my new lay-out. And only then, at long last, did Zhukovsky make that surprised clicking noise with his tongue several times. Then he eyed me over, shifted his glance back to the drawing, and clicked his tongue again.

"D'you know, Alexei, this—" he began, then stopped.

His glance and tone told me that he was no longer woolgathering.

"This is interesting! Very interesting!" he said with the same expression.

It was the third time he had repeated those words, but they were uttered now in a tone that electrified me. Breathless with excitement, I told Zhukovsky of my difficulties.

"Ganshin refuses to do the calculation," I said. "He's not sure of himself. And I can't do anything unless I have the calculation."

"Oh, he's just in the dumps," said Zhukovsky. "He'll manage it splendidly. Just a minute, though."

He held the drawing out at arm's length and studied it again closely. Then suddenly he laughed.

"Well, well, this is a clever ideal!" he exclaimed. "Yes, there are some complications, though. Interesting! You don't realize yourself what an interesting little problem this is."

His eyes kindled. Zhukovsky was caught. Zhukovsky was carried away.

He glanced at his desk and the sheets of paper lying at his feet, muttered something vexedly, cleared a space before him on the desk and laid down a clean sheet of paper.

"You haven't told Ladoshnikov anything yet, have you?" he said. "Don't leave this with me till tomorrow. I'll go into it."

Leaving his study, it was quite as much as I could do to keep from cutting a wild caper.

31

In describing to you these far-off times and the adventures of my youth, I am sometimes amazed myself at all the trivial details that stick in my memory.

For example, I remember perfectly well that the next day was Sunday. And on Sundays Professor Zhukovsky never went out. I came to the house in Milnikov Pereulok in the morning and slipped into the kitchen through the back door. Old Petrovna was frying *pirozhki* in sizzling fat—Zhukovsky's favourite breakfast dish.

"Good morning," I said. "Is Nikolai Yegorovich up?"

The old woman always knew what went on in the house. When she saw me, she waxed indignant.

"You ought to be ashamed of yourself, Alexei Nikolayevich! What have you gone and done to him? What did you give him?"

"What's the matter?"

"He didn't go to sleep till five in the morning because of what you gave him. We all try to take such care of Nikolai Yegorovich, and you go and . . . Don't stand about in the kitchen, please."

I escaped the ire of Petrovna and established myself on the sofa in the dining-room. They were laying the table there and taking a devilishly long time over it. The boiling samovar was brought in. Lenochnka came in I answered her remarks absent-mindedly, listening to the sounds in the next room where Zhukovsky was astir, washing himself. At last he came in for breakfast I looked at him imploringly.

"Not ready yet, Alexei, not ready," he announced right away, smiling. "I'll have to put in some more work on it today."

He glanced at the *pirozhki* and rubbed his hands with pleasure.

He worked all Sunday on the problem I hung about the house all day. Towards the evening Zhukovsky hunted me out himself in one of the rooms.

"Come along, Alexei. It's ready," he said.

He was smiling hugely, and his eyes were as kind as kind could be. In his study he handed me a batch of papers covered with his handwriting. It was a complete calculation of my engine. Like a schoolboy, I instantly turned to the last few sheets which gave the "answers." What I saw made me gasp. It turned out that my counter-balances, in rotating, described an intricate curve. I had never suspected it, although I had made a boat engine on the same lines with my own hands. But it was one thing to rig up a small motor where I just fitted things together, and quite another to build what was then the most high-powered aircraft engine in existence. If Zhukovsky hadn't found that curve, the whole thing would have been unworkable. He had calculated the dimensions of all the major elements, and the rate of revolution on the basis of three hundred h.p. capacity—in a word, he had given my daring scheme his blessings. My delight and gratitude knew no bounds.

"Oh, never mind that," Zhukovsky stemmed the flow, smiling. "Now you can go and tell Ladoshnikov."

"You bet!" I cried. "The LAD-1 will fly now. The Grampus will go too."

"The Grampus? Ah, the amphibian."

"By the way, Nikolai Yegorovich, what do you think—will this amphibian be any good in the war?"

"I don't know. The machine will go, but as to what good it will be in the war—that, Alexei, is beyond me." His face had darkened at once, and he repeated with a sort of glum fierceness that definitely dismissed the subject of war, "I don't know."

It wrung my heart, somehow, to hear him speak that way. I had had no idea till then that Zhukovsky was actually suffering, and what a sore spot I had touched.

I don't know whether he had heard about the Bolsheviks' slogans at that time, but one felt that his country's future caused him great concern.

And I had to go and make things worse by saying: "Podralsky ought to pay you for this, Nikolai Yegorovich."

I picked up the precious sheets. Zhukovsky glanced at me, a flicker of disapproval in his eyes.

"Nonsense. I'll have nothing to do with that swindler."

"I don't agree, Nikolai Yegorovich. You must take at least a thousand from him. Or I tell you what? Ten per cent dividends would be best, I think."

"No more of that. Who wants it? Per cent, dividends...."

"But you do want it! Haven't you often complained about not getting any money for your laboratory?"

"That doesn't prove anything! I don't take tips."

32

I burst into Ganshin's rooms with Zhukovsky's papers in my hand, and turned them over to my friend for his most careful study. We arranged that all negotiations with Podralsky concerning the engine would be conducted by me alone.

"Where on earth have you been?" Podralsky said fretfully, hunting me out in the laboratory.

Pussycat no longer purred or rubbed his paws those days after it had been discovered that we had no engine for the amphibian.

"In the first place," I said coolly, "yesterday was Sunday."

"What about the other days? Where have you been all this time?"

"I was at Ganshin's. Discussing the trouble with—"

"Sh. . . Not a word here. Come into my office."

I found Ganshin sitting in the office.

Podralsky had too good a nose not to have smelled something in the wind when we kept away from the laboratory for so long. His eyes travelling from one to the other, he waited for us to produce a plan of salvation.

But Ganshin just sat there silent and inscrutable. The look of faint mockery lurking behind the lenses of his spectacles was visible to me alone. My own face was as long as a poker.

"I don't know. I can't think of anything. Very likely we'll have to shut up Wood Glen," I said in reply to all Podralsky's fretful questions.

Shut up Wood Glen! Never! It was unthinkable! I kept him like a cat on hot bricks for several more days, he scented something but was all in the dark. Meantime I urged Ganshin on, demanding detailed calculations, and feverishly prepared the main drawings.

At last, one fine day, or, to be more exact, at three o'clock in the morning of a wet spring day, when all respectable folks are abed, I rang the bell furiously at Podralsky's front door.

A light went up in the house and someone spoke to me through the door. I kept on repeating that I had to see Podralsky at once. They let me in.

The master of the house came out in his slippers and dressing-gown.

"What's up?"

"Dress yourself at once. I have a cab waiting."

"What for? Where—?"

"Sh. . . Not a word here."

The words had such an effect on Podralsky that within ten minutes we were sitting in the cab.

"What is it?" Podralsky whispered, burning with curiosity.



But I jerked a thumb at the cabby's back and blisped again, "Sh."

Nothing more was said till we entered Ganshin's room. I was tempted to say, "Lock the door," but that would have been overdoing it. Keeping a straight face, I looked behind the door to make sure there were no spies lurking there, and turned the key in the lock myself.

On show in the middle of the table was my boat engine. Next to it, hands in pockets, stood Ganshin smoking his pipe in utter silence.

Podraisky was all of a dither  
"Are you going to tell me what it is, or aren't you?"  
"Take your coat off," I said

I went up to the motor and reached my hand out towards it, then suddenly leapt to the window with a warning gesture. It was, as you may guess, a false alarm, for no prying eyes were revealed outside the window.

I lifted the top  
"See this?"  
"Yes."  
"What is it?"  
"A boat engine."  
"This engine's going to revolutionize history. This engine's going to be our 'open sesame!'"  
Podraisky stared at me blankly, then he looked at Ganshin.

I started cranking up. With a flash, the engine started chugging. Ganshin held a desk-lamp up to it, and we all three stared at my teen-age invention. The next minute the landlady, roused in the middle of the night, began to hammer furiously on the wall. I switched off at once and whispered again, "Sh."

When peace was restored, I said  
"What do you say to it?"  
"To what?"  
"To an engine."  
"What engine?"  
"One capable of driving a ten-metre wheel."  
"Have you invented something?"

"Yes You've just seen it "

Podralsky was quite at sea Before him stood a small outboard motor used for pleasure trips.

"On the same principle as this engine," I uttered with due solemnity, "we'll build one of three-hundred horse-power "

The slapstick preliminaries over, we got down to real business We showed Podralsky the rough drawing of the future engine, explained the principles on which it worked, and laid out Zhukovsky's manuscript, Ganshin's detailed calculations and my own drawings

Finally I announced bluntly-

"Here you have It 'It' with a capital letter A fifty-fifty contract "

Ganshin afterwards told me that my voice had a hard metallic ring in it It was that more than anything else, I think, that decided Podralsky He accepted the ultimatum, and was so happy that he all but hugged us on taking his leave

His parting words, nevertheless, were

"But why the devil did you wake me up in the middle of the night?"

I answered gravely

"These things are best discussed at night "

"At night?" Podralsky queried, then after a moment's reflection, "maybe you're right Yes, I think you are."

As I shut the door behind him I could not resist a last whispered warning-

"But hush! Not a word, for God's sake. "

The next day Podralsky signed a contract with us on a fifty-fifty basis, gave us an advance, and, as a special mark of esteem and gratitude, presented to each of us a magnificent motor-cycle

The order for building the Adros was placed with the "Dynamo," a Moscow works, Podralsky paying a fabulous sum for express execution

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I went to the works every day, kicked up rows over the slightest delay, and gave instructions to the foremen and the workers.

At Wood Glen, in the meantime, things ran their normal course.

Orders for the different elements of the huge chariot were placed with big factories—the Kolonna, Sormovo and Putilov works. The treads for the ten metre wheels were made under the guise of caissons, and the fore and aft sections of the Grampus under the guise of icebreaker parts.

In Moscow we occupied the premises of a big riding-school and used them as a workshop where we took delivery of the different elements and had them checked by sub-assembly before being transported to Wood Glen.

Out there, under winter conditions, the gigantic steel wheels were riveted in the open. A forge and a machine-shop where the various pieces were turned and scraped fit were built on the wooded bank of the river. The men lived in damp quarters and worked in the frost amid smoky camp fires which gave no warmth. The men sent to work in this hell called our monster machine the "go-devil." Three field-engineer companies, or, to put it in plain words, several hundred mobilized workers dressed in soldier's uniform, were working at Wood Glen. Being sent here was like being sent to the front, or rather to detention barracks—no furloughs were granted, not even for twenty four hours, and the sentries let no one out of the barbed-wire enclosure.

From the very first day of Wood Glen's existence the men were eaten up alive by fleas, so-called wood-fleas of tremendous size. But more hateful than any fleas were the men in command. The most brutal officers seemed to have been specially selected for Wood Glen. The soldiers were made to work sixteen hours a day, and were knocked about and beaten with rifle butts. Ganshin and I twice had a row with Podolsky on that account and told him that we would not go to Wood Glen again unless this brutal treatment of the men was stopped. After

that the officers, as far as we knew, did not use their fists on the men any more

The wheels, incased in wooden scaffolding, were run up like a house under construction. The idea was that when this experimental model had been completed and tested, they would immediately start building several dozen of these machines at the Putilov, Obukhovo and Sormovo works. These were to be shipped disassembled in tarpaulin-covered trucks to the Black Sea, where they were to be reassembled in a fortnight and put into service.

In the meantime the Adros was being assembled at the factory. In the course of the fitting many pieces had to be recast and re-turned, adjusted and dressed by hand. I was at the factory from morning till night, altering the drawings, and in my impatience even going to work myself with file and hammer. I grew more desperately nervous as testing time drew near. Was the design correct? Would the engine work? Would it pass the test for power output?

#### 34

It was a year since Podralsky had asked mysteriously, "What do you say about a wheel ten metres across?"

The assembly of the Grampus was nearing completion, and the Adros engine had already been built. The start up of the engine was a brilliant success. The Adros started working at once. The admiration of those who witnessed it, however, was short-lived—after three minutes the engine broke down.

A few days later, the trouble repaired, we cranked her up again. This time she ran for six minutes, then coked again.

The torments of so-called "developing" began. In those days we had only a foggy sort of idea about this developing business. As for the problem of production manufacturing of aircraft engines, there we were completely at sea. It looked simple enough: you had an engine built, it had to be installed in its place as quickly as possible,

and then hundreds of others like it were to be manufactured and put into service. But we were sadly mistaken. We repaired the Adros and started her up over and over again. She worked then broke down again. After a month of gruelling toil we got her to run for twenty minutes. On the twenty-first she broke down.

But our patience was at an end. We were eager to test her in a loaded-up condition. Test her in the air! Harness her in Ladoshnikov's plane! Try to make the LAD-1 leave the ground!

But what if the engine failed in flight? What pilot would agree to test an airplane with such a faulty and unreliable engine? But the pilot would risk it—of that I was sure!

And Podralsky? What stand would he take? According to the laws of contract existing in the Russian Empire Podralsky was the legal owner of my engine. To top the peck of troubles I had to grapple with, there was the problem of how to wangle permission out of Podralsky to have the engine installed in the airplane. No, he would never give it! After all, it was the one and only engine we had, and it was meant to drive the amphiblan as soon as it was ready. No, it was no use trying. Podralsky would never agree to it. Then what was to be done? Ganshin and I could not think of anything.

Unforeseen circumstances came to our rescue.

### 35

It was like this. An order calling students to the colours was posted up in town at the end of nineteen sixteen. All prolongations were cancelled. I told Podralsky that I was being called up and that it was necessary to get a release for me.

"Yes, of course," he said. "We'll fix that."

But the days passed and Podralsky did nothing. I reminded him, and he purred again, "That's all right! We'll fix it."

At last, I got a call-up notice. I was to report at the School of Ensigns at ten o'clock the next morning with

my travelling kit. That meant dropping the Adros, the Grampus, the LAD-1! With the notice in my pocket I rushed off to see Podralsky

"The master is dining," said the maid.

Dining, was he? Good. Just the right moment for a talk! I expected to see a blissful Pussycat smacking his lips with relish, a dazzling white napkin tied round his neck. What was my surprise when I found him pecking listlessly at his food. The plate with roast meat was pushed away, barely touched. And the napkin was tucked carelessly under the collar of his shirt. What was the matter with my patron? What had upset him?

Irresolutely, I laid the call-up notice on the table.

"That's nothing," Podralsky said. "We'll see about that today. Everything will be decided today."

"Everything? Why, is anything the matter?"

Pussycat by force of habit glanced over his shoulder to make sure the door was shut, and said confidentially

"Today I'm seeing a very, very important person. A good deal depends on this meeting."

"Is that so?"

Podralsky leaned over and dropped his voice still lower.

"Everything depends on this person. Either he'll sign a new grant of funds, or . . . Well, you know. We have no funds to carry on with. But sh. . . Not a word, for God's sake!"

"No funds? But where's the million you got?"

Podralsky gave a low whistle and said

"Expenses. Colossal expenses."

"If that's the case. . . But why shouldn't he sign it?"

"Because . . . or . . . because someone has been trying to set him against me. He may have a general inspection set up. And that means—"

I did not let him finish the sentence. Now or never, I said to myself

"But you have a wonderful trump-card!"

Podralsky looked up at me quickly

"Meaning?"



"Of course, it may be just another flight of fancy."

"Not at all, not at all. You are a very clear-headed fellow, Alexei Nikolayevich."

"Thanks. Well then, there's a splendid answer to all unpleasant questions concerning the amphibian."

"What is it, what?"

"You have the most powerful airplane ready to take the air, and you have an engine for it."

Podralsky's face registered interest. He was obviously considering the idea. I hastened to clinch the argument.

"No, really, why shouldn't we try out the LAD-1 while the Grampus is waiting? It'll be a sensation! A new Russian machine, the best in the world, takes the air! Lifted by a Russian engine too!"

"H'm H'm. And you think the LAD will take off?"

"I am positive! I'm absolutely convinced."

"Well, it's worth thinking over."

Oh, he's swallowed the bait, hook and all, I said to myself.

"Look here, my dear boy," he said, "When can this be done in your opinion?"

"Within the next few days."

"I see. I'd ask you, please, Alexei Nikolayevich, not to leave your house today. I'll send you a messenger."

### 38

Leaving my call up notice with Podralsky, I went home. I waited for his message impatiently. The day ebbed into evening, but no one called. At last, at ten o'clock, a messenger came and brought me a most puzzling note from Podralsky.

It ran: "Dear Berezhkov, get on your motor-cycle at once and come down to the riding-school. Be sure your lamp is in good working order."

Why the lamp? It sounded odd, but I had no time to puzzle it out. I went out immediately, primed the lamp, and scorched off to the riding-school.

I noticed, as I rode up, that there was something unusual about the scene. I saw a sentry, then another, and

a third, standing like stone images. A luxurious Rolls Royce was standing by the curb.

A sentry barred the way

"Your pass, please!"

I got out my pass, but just at that moment a smart officer came running up

"Berezhkov?"

"Yes."

"Drive in through the gate, please."

Burning with curiosity, I rode into the dark shed. It seems crazy to me today that we didn't install electric lighting in the place so that we could work double shift, seeing the hurry we were in. It was the devil of an amateurish job, was that great enterprise of Podralsky's.

The dim shapes of metal constructions leapt out of the darkness in the light of my lamp. I saw no one, but suddenly I caught the faint aroma of expensive tobacco.

I turned my head at the smell and saw two glowing red points in the dark—two cigars.

"Stop! Come over here," came Podralsky's voice.

I went up, and in the reflected glow of my cycle lamp, which was turned the other way, I could dimly discern the figure of a military man with a grey moustache.

Podralsky introduced me.

"This is Berezhkov, my head designer, the one who constructed the Adros engine."

"Ah, glad to meet you," the military man said rather drily.

"It's his engine that's going to lift the airplane I was telling Your Excellency about."

"How soon will that be?"

"Within the next few days. We intended telling you about it after the successful event. We meant it to be a little surprise for you."

"Well, if it will be a success . . ."

"We don't doubt for a minute that it will. We'll prove that to you in a day or two, Your Excellency," Podralsky continued confidently. "We have everything ready. Money, of course, has been no object to me. The results

speak for themselves—we now have an excellent engine of our own which has shown splendid performance in factory tests. The only trouble is, Your Excellency, or this young man, my principal inventor, is being called up into the School of Ensigns. ”

“Oh, that’s nothing ”

The military man drew a white little card from the inside pocket of his greatcoat—I caught a glimpse of the red lining usually worn by generals—and said,

“Where can I write a few words here?”

Podralsky told me to wheel up my motor-cycle. Then he gave the old gentleman his fountain pen—Pussycat always carried that latest word in technical progress about with him—and in the light of my lamp the general wrote something down on the slip of paper and handed it to me, saying:

“Give that card to the chief of the school ”

Then they began talking about the amphibian. I played my lamp on the various fabricated parts, which happened to be there that day. Then they stepped aside into the dim shadows, conferred there a while, and made for the exit.

At the sound of the departing Rolls Royce I jumped on to my motor-cycle and drove homeward. I had not gone more than fifty yards when I suddenly reminded myself of the note. I stopped the bike, got off, and held the visiting-card up to the lamp. The light fell on a line of small printed type. I bent lower and read “Mikhail Vasilyevich Alexeyev.” Oho, this was a big bird Podralsky had caught! The Chief of Staff of the Supreme Commander-in-Chief! On the back of the card I read “Student Berzhkov, pending special orders, is not to be enlisted in the School of Ensigns ”

The next day I went to the school and presented the card. They gave me my release with the greatest courtesy, the chief even saluting me at parting. They gave me no papers, though, and the special order concerning me is still pending as far as I know.

Again the boundless open field—the Moscow Airfield. A January morning, nineteen seventeen. The snow looks as if it has had tiny diamond crystals scattered over it, scattered about unevenly, here with a full hand so that they dazzle your eyes, there more sparingly, just a little. I can still see that sparkling expanse and the gold and silver alloy of the sun's disk in the sky. Dead as I was during those hours to every outside impression, insensible to everything that did not directly concern the plane and the engine, I was aware of that sun. It's a good omen, I thought.

Soon the LAD-1, powered with my engine, would be brought out on to the clean-swept runway. Would she take off? Would she? No one put that thought into words, the hundred and one little details connected with the air trial preparations kept my mind off the coming ordeal.

On the eve of the test we had all—the assembly crew together with the ground men who had come to lend us a hand—spent the night in the air shed. The fitters again went over every unit and member of the airplane, replacing parts here and there, tightening things up again. All orders were issued by a single man—Ladoshnikov.

He had one peculiarity, which I don't think I have mentioned. When at work, that habit of scowling fell away from him. He was much more at his ease here, more cheerful and better looking even. Standing in the frost-ed shed, where warming pans with smouldering coals barely sustained a temperature of several degrees above zero, issuing orders to a dozen fitters clustering round the huge plane, which stretched its dark-green wings from wall to wall, Ladoshnikov felt quite in his element. In his short sheepskin coat, fur-cap and felt boots, with callipers in one hand and a spanner in the other, he went over the plane, tirelessly checking up the work. His orders were terse, cool and precise, and he did not seem to be a bit nervous.

It was not until the last moment, when we had taken hold of the towing lines to bring the plane out, that he let himself go.

a blow-lamp. I was about to curse myself when suddenly the engine made contact and roared into action.

Then she started misfiring—one earsplitting explosion after another. For a moment I stood paralyzed, breathless, my lungs felt like bursting. At last the Adros started throbbing rhythmically.

All else now was in the hands of the pilot. I could do nothing more. I stepped aside and went up to Ladoshnikov. He stood tight-lipped and silent, taking no further part in affairs. He threw me a dark sidelong glance and turned away. Naturally, he was in no mood to listen to anyone or be looked at just then.

The pilot fanned the engine for several minutes. Then the LAD-1 moved off, gliding across the snow. The machine retreated from us faster and faster. Her dark silhouette on the gleaming snow diminished. I bent down, so as not to miss the moment when the skis furrowing the virgin snow would suddenly get unstuck and float above the field. I looked—and there they were actually swaying above the snow, floating in mid-air. I felt like shouting, but I couldn't find my voice. And the LAD-1 was already flying—can you imagine it!—actually flying over the Khodinka airfield. The Adros engine was singing its song of power in the sky.

I ran up to Ladoshnikov, and saw his laughing eyes—they had suddenly grown big and intensely blue. In his joy he poked me playfully in the stomach with what he no doubt considered to be a light and friendly jab, but it literally knocked me off my feet. Everything went dark, and I believe I stopped breathing for several seconds. Ladoshnikov rushed up to me, but I implored:

"Get away! Step back, will you!"

Instantly forgetting my pain, I searched the sky. The LAD-1 was stooping about the airfield, and I listened with delight to the roar of her engine. Yes, it was a moment that no one could ever take away! No matter what happened after, the fact remained that Ladoshnikov's plane had taken to the air! And it was my engine that did it!

But, hark!—what was that? Why had the engine suddenly gone dead? Had it failed? It looked like it. Would the pilot be able to set her down? Did he have a sufficient margin of altitude?

We all watched the plane with bated breath. Way out on the extreme edge of the field the skis touched ground, the plane raced along amid a cascade of snow dust, then she bounced tall-high, slumped heavily on one side and lay still.

We ran up to her. We found that the plane, in landing, had run into a ditch. The hero pilot Odintsov was safe and sound.

39

All this had been written down in Moscow at Berezhkov's lodgings. Now we were standing in a wide forest clearing, in the middle of which towered the gigantic amphibian, buried almost up to its hubs in the birch scrub.

"Well," Berezhkov said with a sly smile, "I can't show you the LAD-1, I'm sorry to say. But as for the Grampus—here you are!"

"Did you ever get the thing to move?"

"Oh, that's another story. Quite an experience, too. We tested the amphibian that same winter. The Adros was shipped out here after she had been overhauled again, and was rigged up in the belly of the Grampus. A lane was cut through the ice right across the river for testing the amphibian afloat. Before launching the machine we went over her again and tightened everything up. I was terribly nervous. We would soon know definitely whether the thing had been properly constructed or not, whether it would move or crack up the moment it got started.

"We couldn't get the motor going for quite a time. At last it began to pound away inside the armoured casing. The heavy chariot, stuck frozen to the ground, began to shudder in all her frame. I got into the driver's seat. Next to me sat Podralsky.

"I put the lever over into first, then carefully, with bated breath, began slipping in the clutch, feeling the in-

creasing load in all my nerves and the marrow of my bones. Suddenly there was a sharp snap. My heart sank. But the next moment I realized that the sound had been caused by the metal wrenching free from the ground's frozen grip, that the wheels had turned and were moving forward.

"The crowd fell away, clearing a path for it. The men who had had such a hard time here building that monster, cheered and tossed their caps in the air. I heard nothing, felt nothing but the throb of the engine and the stress of the metal in its critical joints. The engine, which had taken a tremendous load at the start, was now running steadily and easily. I put on speed, the wheels obeyed me. With a roar and a clatter we got ahead of the running crowd. Close by stood an age-old birch. I headed the amphibian straight towards it. Podralsky clutched my shoulder. I caught his anxious look, but a spirit of mischief had seized me in my elation. The birch tree came closer. A barely perceptible jolt and it snapped like a matchstick. Wait a minute. I'll find it."

Berezhkov, limping, ran lightly towards the forest.

"Here you are!" he shouted.

I quickened my step. Berezhkov pointed exultantly to a thick rotting birch stump which crumbled when he kicked it.

"Well," Berezhkov said, smiling, "what do you say about a ten metre wheel?"

"I'd never believe it. And what happened next?"

"Would you like to know?"

"Wouldn't I! The birch snapped, and then what happened?"

It turned out, answered Berezhkov, that for all my wild excitement, acceleration and knocking down of birch-trees, I had not travelled more than sixty yards. The amphibian had been running for no more than a minute and a half—eighty-eight seconds, to be exact. Ganshin had timed it on his stop watch. On the eighty ninth we got stuck. The engine was running, the huge wheels skidded, shooting up lumps of frozen earth, but the amphibian wouldn't budge. Then, with an awful crash, the engine

broke down I jumped off the machine. Looked it over. The massive rear roller had ploughed a deep black strip and got buried in the ground. That hippomonstrosity of ours never reached the water lane. There and then we decided to increase the diameter of the rear roller.

Anyhow, the fact remained that the engine had set the wheels going after all. And it had lifted Ladoshnikov's machine tool. Our Russian engine, the Adros, then the most powerful petrol engine of the aircraft type in the world, designed on unorthodox and absolutely original lines, was a reality, it existed. The thing now was to repair it and start production manufacturing as quickly as possible.

At that time, alas, I did not understand the meaning of those three simple words "creating an engine." I shan't go into that now, but let me tell you briefly that without a first-class industry, the finest and most talented of engine designs will never become a reliable industrial fabrication.

There was a lot more I did not understand then. I was soon to learn that history was to be revolutionized not by ten-metre wheels or three hundred horse-power engines, but by powers of quite a different order, powers I had no idea of at the time.

It was the year nineteen seventeen. I am ashamed to say I did not even try to understand what was going on. During the days of the February Revolution I just loitered about the streets, gaping. What worried me most was the fate of my Adros.

#### 40

Let me finish the story of that fantastic wheel, though, Berezhkov went on.

The February Revolution found the Pussycat with all his wits about him. For a time, at least, he seemed to be thriving. His chubby face shone beatifically, and he smiled and smacked his lips in anticipation of the fabulous profits he was going to rake in. He had contrived to get a new subsidy out of the Provisional Government. But it



wasn't long before his temper began to get badly frayed. The workers in soldiers' uniforms, who lived in barracks at Wood Glen, had elected a committee of soldiers' deputies and were demanding human conditions. Some of the most hated officers were beaten up and kicked off the grounds. Podrasky arrived at Wood Glen with a red silk bow in his lapel, called a meeting, clambered on to the go-devil, and started a speech calling for war to the victorious end. He was dragged off the "platform" and trundled away in a wheelbarrow.

The soldiers' committee elected me works superintendent and even co-opted me as a member. I still have the paper certifying that I was a member of the Executive Committee of the Soviet of Soldiers' Deputies. In the whirl of events, however, the fantastic chariot was soon forgotten and neglected. My head was full of new ideas and I stopped going to Wood Glen altogether. As for the engine, Ganshin and I put a great deal more of work into her development, but that's another adventure, another epopée.

"That, strictly speaking, is the whole story," Berezhkov wound up. "Although."

Reminding himself of something, he smiled and held up a forefinger. It was a sign that another curious little story was forthcoming.

There's a sequel to the story of the go-devil, though. One day, when the country was at civil war and things were at their tensest, a summons was delivered to me at the Moscow Inventions Bureau—it was one of the several jobs I was holding—asking me to call at a given hour at the Department for Combating Economic Counter-Revolution of the Vecheka on Dzerzhinsky Square (then the Lubyanka). Although I was not conscious of any offence on my part, I went there in no easy frame of mind. A pass was made out and I walked in. I was kept waiting in the corridor for some time. Then I was invited in to one of the inspectors. He was very nice to me.

"Please sit down. Are you the Berezhkov who built the amphibian in the woods?"

"Yes, that's me "

"I'm very glad to meet you Are you aware that that machine is still standing in the forest?"

"I regret to say I haven't been there for some time But I should imagine it's no easy job to get it out."

"But it's in danger of being destroyed We have received reports that the population are pulling it to pieces What's to be done with it? Do you consider the idea of that machine technically sound?"

"I said that the thing was now only of historical interest An amphibian with hollow wheels was just a curiosity The only thing of value was the engine, and I was still working on that

"Still, what are we to do with this amphibian?" the Inspector asked

In my opinion, I said, it would be very edifying to make a public exhibition of it on some waste plot or other—somewhere by the Moskva River on Vorobyovy Hills Let that immense amphibian serve as an emblem of the tsarist regime, which tried to defend the country with the aid of such monstrosities

I was thanked for the advice and dismissed

We were crossing the clearing to where the motor-cycle stood The moss felt springy underfoot, the young birches were rustling, the sunbeams were dancing, and the air smelt of fresh and mouldy leaves and of moist warmed bark. Berezhkov inhaled these forest smells with obvious pleasure.

"That'll do for today!" he cried when we reached the motor-cycle. "Come along! I'll drive you home "

"Alexei Nikolayevich, when will I be seeing you again?"

"You want the continuation?"

"I do "

"All right, then, come and see me again on Sunday You'll get the continuation."



A NIGHT OF STORIES

1

Berezhkov could not meet me the day he promised. The "interviewer" came at the appointed time, only to be told "Alexei Nikolayevich is out of town."

"Where's he gone to?"

"Where he's been sent. He never tells us."

"When will he be back?"

"He said he doesn't know."

I had no choice but to take my leave. Ah, well I'd have to arm myself with patience, I daresay. One day passed, then another, but there was no sign of Berezhkov. On the third day at last he answered the phone.

"Alexei Nikolayevich? Is that you? Good morning. I've been suffering torture all this time. I'm dying to hear more."

"I'm sorry, but there'll be nothing doing until the twenty-fifth. Your sufferings will be eased then."

"Can't you do it before that, Alexei Nikolayevich?"

"Frankly, I'd like to myself."

"Then when may I come?"

"Come and see me the first Sunday after the twenty-fifth."

This time your "interviewer," made wise by experience, came early to make sure of catching Berezhkov at home. I was told that he was still asleep. That was a good omen.

"Fine. Don't wake him, please. I'll wait till he gets up."

I was shown into his study.

It was a room that expressed the character of its occupant. I saw Berezhkov here at his intrinsic worth, as it were, shorn of all the tinsel. Not a single useless or superfluous article. The writing-desk had so much free space on it that one was involuntarily reminded of the saying "clear the decks for action." Against the walls stood attractive and very convenient bookcases designed obviously by the owner. Over the desk hung a full-length photographic portrait of Nikolai Zhukovsky, the one I have already described, showing the professor in a wide-brimmed hat, jackboots, and with a shotgun.

The telephone rang in the bedroom next door. Then I heard a familiar voice.

"Hullo. Free play? In what cylinder? And how's the oil feed?"

Berezhkov asked a few more questions of a highly technical nature, then said:

"I'm getting up. I'll be at the drome inside of an hour."

My spirits were damped at once. Ten minutes later Berezhkov came in, clean-shaven, dressed, and smiling.

"I heard you humming a tune here," he said, shaking hands

I was surprised.

"Me? I was sitting as quiet as a mouse."

Berezhkov began to sing:

"Now little birdie you're caught in the net!" He looked at me with laughing greenish eyes, and spread his hands apologetically. "Sorry the bird is flying away."

"It's no joking matter for me, really," I said.

"Never mind, you'll find things easier after the fifth."

"But you promised me after the twenty-fifth."

"Nothing doing. Unforeseen accident."

"You don't look it."

Berezhkov laughed.

"It isn't very pleasant, of course, to have your engine break down during the test, but in such cases I always say 'If she hadn't failed here today she would have conked in the air tomorrow. As it is, we now know what's wrong with her.' And so I'm off to see what the trouble's about."

"Can't I go with you, Alexei Nikolayevich?"

"I'm afraid you can't."

"A secret?"

Berezhkov nodded and raised a warning finger.

"Sh. Not a word."

His eyes were laughing again. He was now a distinguished aircraft engine designer, whose youthful vagaries were a thing of the past, yet the blood of the old impetuous Berezhkov still ran strong in his veins.

"Can't be done," he said gravely. "But after the fifth."

"After the fifth what?"

"After the fifth, if nothing supernatural occurs to prevent it, I'll be able to tell you all about it."

He invited me into the dining-room.

"Have some breakfast with me."

Sliced ham and green peas were brought in from the kitchen in a sizzling frying-pan. Fresh shredded cabbage was served up in a bowl.

"The elixir of youth!" Berezhtkov said, glancing at the cabbage. "This is my regular morning dish."

Obviously it was not the cabbage that was his "elixir of youth." Without a doubt, the thing that kept him so young and full of go at forty was the joy of creative work, further stimulated by some important job he now had in hand and which, for the time being, was a secret to me.

"Perhaps you'll tell me something to fill the hour up?" I suggested.

"All right. Would you like to hear a stunning episode of the year nineteen nineteen?"

## 2

After that affair with the Adros engine I told you about, Berezhtkov began, there was a period in my life when I turned my hand to various odd jobs, after which came the grand epopee under the general heading of "Compass." I'll give you a fuller account of all that some other time, but just now I'll let you have the essential facts about the Compass. One day, in the spring of nineteen nineteen, Ganshin breezed in.

"Berezhtkov, you're wanted. Mount your bike and let's go."

"Where to? What for?"

"To Zhukovsky. He has received a letter from the Council of People's Commissars, asking him to help build a squadron of aerosleighs for the Red Army. The Compass is meeting at his place today for the first time."

"The Compass? What's that?"

"Abbreviation. Stands for 'Committee for the Production of Aerosleighs.' You've been enrolled as a member. And I, as you see, have been sent to fetch you."

"All right, I'm ready. There's one little drawback, though."

"Only one? What is it?"

"I have never had anything to do with aerosleighs."

"And who has? Only Gusin and Ladoshnikov. And now, for the first time in world history we are to start building

aerosleighs on an industrial scale. This kind of weapon has never been used in war yet. It will be a mechanized cavalry on runners."

"Dash it, a splendid ideal!"

"We'll see what tune you'll sing when the Idea Bops. And that's what's going to happen, I'm afraid."

"Croaking again! Come along!"

And off we went to Professor Zhukovsky

Zhukovsky was the founder, the spiritual father, so to speak, of the Compass, while its practical leader, the chairman of the committee, was another distinguished professor of the Moscow School of Engineering—August Ivanovich Shelest, head of the Department of Internal Combustion Engines and a specialist in aircraft engines.

Well then, a few months after we had started this aerosleigh business (I will give you the story of those most interesting months next time), during a night sitting of the Compass—and we met, let me tell you, times without number and mostly at night—the telephone rang. Shelest answered it. After the first few phrases he turned to us and waved his hand frantically, commanding silence. His voice alone could be heard in the hushed room.

"The Kutafya Tower? At six am.?"

Plainly he was making a great effort to speak calmly.

"Yes, we have petrol. Who? Yes, that's clear."

He put the receiver down, turned to us, and said, "That's done it."

Shelest, I remember, was not the kind of man to give way to dejection. Our chairman at that time was on the sunny side of fifty, but he had not put on weight, and was still a favourite with the women, a sportsman and an enthusiastic motor-cyclist. Not even the iron-grey at his temples made him look any older. He possessed tremendous reserves of vitality, cheerfulness and humour. These, by the way, were essential qualities in a man if he was to build aerosleighs at such a time.

But just then Shelest looked put out.

"That's done it," he said bleakly.

"What's the matter?"

Shelest answered

pleting a course of studies at the Aeronautical Institute. That day she was not at all as grave and aloof as I had once thought her. So this slim, fair-haired student-girl, this unaffected, at once cheerful and very earnest young woman was the wife of the well-known aircraft engine designer.

In a corner sat a blue-eyed man in a gray summer suit, about ten years younger than Berezhkov. On being introduced, he stood up and gave me his hand with a shy smile. I noted the rather soft indeterminate line of his mouth, which seemed to point to a mild disposition, and was all the more surprised at the firm strong grip of his hand. Of course, I registered this contrast between hand and mouth subconsciously, and did not think of it until afterwards.

The kind old eyes of Professor Zhukovsky, photographed at the blackboard in the lecture hall, looked down at us from the wall.

After shaking hands all round, I saw a figure curled up on the sofa in a corner of the room. Judging by his regular breathing the man was asleep.

"That's the proverbial Ganshin," Berezhkov said with a nod in his direction. "This is the best I can do by way of introducing him for the time being."

Berezhkov then resumed the occupation which my arrival had interrupted.

He was roasting coffee beans on an electric hotplate.

Three bottles of champagne with massive corks in tinfoil wrappings lent a festive touch to the table.

"Battery for the salute!" Berezhkov explained. "We'll fire the salvo when the record's beaten. Meantime... I'll soon give you a taste of real good coffee properly prepared."

He shook the beans with an expert hand, explaining that coffee should be roasted directly before being made, and that the only pan suitable for the purpose was neither an aluminium nor an enamelled one, but a cast-iron skillet.

"Nothing but a cast-iron skillet," he repeated. "And be sure the beans crackle when roasting."



I could picture Berezhkov checking his engine, preparing it for the flight, sitting and listening to its mighty roar for fifty, eighty, a hundred hours. It must have been those endless hours that he had in mind when he promised to call me up in the night. But nothing had come of it, unfortunately.

The next day the newspapers carried further reports of the flight. The plane had been in the air twice round the clock. At nine in the evening the radio broadcast a log report from the airplane, saying, "Have done nine and a half thousand kilometres. Earth screened by fog. All in order. Are continuing the flight."

I thought of Berezhkov. Should I ring him up? I could imagine how excited he was, waiting for those reports. No, this was no time to bother him.

Then all of a sudden, after ten in the evening, I was called to the telephone. Picking up the receiver I could hardly believe my own ears—it was Berezhkov calling.

"Come round! We'll make a night of it."

I lost no time. Within twenty minutes I was entering Berezhkov's flat.

5

I found guests there. I needn't mention them all, but I must say a word about Berezhkov's sister Masha.

Detached and calm, she was, of course, a contrast to her brother, but for all that the family likeness, the "Berezhkov strain," was unmistakable. Nature had endowed them with one and the same open and engaging smile. Only by a strong effort of imagination could one picture the brother or sister in the dumps or bad-tempered.

As for Berezhkov's wife I had seen her only once, and that had been a passing glimpse. I remember her coming in from the street with a firm tread, carrying a roll of drawings and a bulky brief-case, and looking, I thought, rather grave and tired. Berezhkov once dropped a remark about her having thrown up her studies in order to help him with the designing and development of his aircraft engine. She was now making up for lost time and com-

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"Nothing but a cast-iron skillet," he repeated. "And be sure the beans crackle when roasting."

He bent over the pan, listening, then suddenly said  
"That's just how I feel now—on hot coals."

Everyone laughed at his jokes and joked back, but of course no one for a minute forgot that an airplane powered with his engine was sweeping the expanses of Central Russia.

After a while a cup of coffee was poured out and placed before me with a plate of sandwiches.

"Tell us something about the flight, Alexei Nikolaevich," I said.

"Some other time. I can't until they've set 'er down. Let's talk about other things today."

He sat down on the sofa at the feet of the sleeper and leaned back comfortably in the corner.

"And so we begin the night of coffee and stories," he announced.

There was a hush of anticipation, but all of a sudden Berezhkov jumped up. He brought the telephone in from the next room, plugged the long flex into the wall socket and placed the telephone set next to him on a chair. He reached his hand out to the receiver, then sighed and thought better of it.

"They've driven me out."

"Who has?"

"Them at flight headquarters. And quite right too. Ordered me off to sleep. They gave orders that none of my calls were to be answered."

Sighing again, he glanced round the room, went over to a chair on which hung a light coloured scarf that must have belonged to one of the women, and threw the scarf over the telephone. Then he sat down again.

"Well. Let's begin the way they used to in the good old romances. place thy hand in mine, gentle reader."

Everyone was looking at him. But he could not sit still. Jumping up again, he crossed to the door, which was ajar, and shut it.

"Why did you do that?" I asked.

"The fluids evaporate," he explained.

He lowered himself on the sofa again, leaned back

against the cushions and sat there for a minute or so with an absent look.

"Alexei Nikolayevich," I said, "you didn't finish that account of the aerosleigh trip last time. What happened after you started out? Let's all hear the story."

"All?" Berezhkov repeated with an amused air. "You're the only one here who doesn't know it. I hope the others will excuse me for a twice-told tale."

Requests came from all sides

"Tell us about the tin of enamel paint."

"And the inventions bureau."

"No, tell us about Kronstadt."

"I'll tell you everything," Berezhkov promised. "All the strange happenings in the life of your obedient servant will be related to you this evening. With your permission, however, we shall take things in chronological order."

The "interviewer" got out his notebook and pencil.

"We'll get round to the sleigh trip, too," Berezhkov said, addressing me.

## 6

Well, then, let's start from the beginning, he resumed. It was the year nineteen hundred and eighteen. I didn't understand much of what was happening at the time. As you know, I was always crazy about technics, and the Bolsheviks didn't strike me as having the slightest interest in technics. Politics to me was a sheer waste of time. What had the Bolsheviks and politics to do with the wonderful things I dreamt of designing?

I didn't philosophize much about it either. I was twenty-two, ideas, schemes and fantasies gushed from me as if under pressure of a thousand atmospheres, I was ready to throw myself into any work so long as I had a chance of inventing and creating something.

At that time an appeal of the Soviet Government was published in the newspapers calling on all engineers and technicians to take up the jobs they had specialized in.

After reading the appeal I went out of the house and walked about aimlessly, thinking what was I to do, where was I to go?

The appeal spoke about specialties, but what was my specialty?

A designer of dream projects. The best thing would be to have an office of my own with a modest sign "Orders handled. Fantasies of every kind designed." But I couldn't go anywhere with such a proposal, I'd be kicked out. I had to get a job somewhere. In what capacity, though? The thing I loved best in the world was motors, I suppose. But where were they handling motors these days?

Musing thus, I wandered about the streets of Moscow, which were already dusted with snow. In my rambles I stared vacantly at the placards, bills, notices and decrees that were pasted all over the town.

Suddenly, in one of the doorways, I saw a sign "Central Motor Section of the R.S.F.S.R."

Oho, motors! The very thing! So in I went.

The office consisted of several cold empty rooms in which sat two or three comrades in greatcoats.

I introduced myself as a last-year student of the Moscow School of Engineering, presented my documents, answered a few questions about myself, and was taken on there and then in the capacity of manager of the organizing department. I got a sheet of paper and wrote on it: "Organizing Department, Central Motor Section of the R.S.F.S.R." I pinned the sheet on the door of one of the rooms and installed myself in it.

The Motor Section had a fleet of some twelve to fifteen cars. We issued vouchers for the use of those cars. But to get a car from us was a hell of a job, even against notes of the Council of People's Commissars. Our cars were always out or under repair.

This managerial job of mine was pure clerical work. I was for ever writing up plans, reports and what not. In a month or two, however, when I got the hang of things, I let myself go with a vengeance, and submitted a grandiose scheme for setting up a central service garage in Moscow for a thousand cars. It was a marvelous job of work, that project—a volume at least an inch thick. It described the duties of the service staff, from the

manager down to the sweeper, in minutest detail, and had an appendix with dozens of diagrams and charts. The project provided for the construction of a two-storeyed circular garage building complete with hoisting gear and automatic signalling. When a car went out, a red light flashed on at the control-desk in the signal room, and when it came back a green one went on. A button was pressed at the office where a car was needed, and a number sprang up on the distributing board in the signal room. The drawing of that room was done in colours. I showed a girl sitting on a revolving chair and controlling the whole of Moscow's motor service.

Naturally, the whole scheme could not have any real significance for present-day use. But I enjoyed this glimpse into the future. I wrote and drew the thing with genuine enthusiasm, my head in the clouds.

Meantime, on the ground next to the Alexandrovsky Railway Station, there stretched a motor-car cemetery. Cars were dumped there just anyhow—wheels up, on their sides, one on top of the other. Several thousand smashed and broken cars lay piled up under the open sky. They had been shipped to Moscow from the Western Front, and were mostly vehicles that had been purchased from the allies. There was nowhere to repair them, and nothing to repair them with—the spare parts having been lost if they had ever come at all—and anyone who felt like it could strip the cars without hindrance.

Petrol was scarce. Cars were run on kerosene, on gasoline, on alcohol and even on brandy. We filled up on alcohol at the distillery in Lefortovo. The car would drive through the open gates into the yard where a filling tap had been fixed up outside to avoid writing out passes. Pure alcohol ran from that tap. It was sheer extravagance through sheer poverty.

My motor-cycle ran on kerosene. Before starting out I had to make the carburettor red-hot with a blow-lamp, and after that the bike ran beautifully. If the engine slobbered on the way, the blow-lamp was got out again, the carburettor was heated red-hot, and off we went again.

But very often no alcohol, kerosene, or petrol was to be had for love or money. Factories were at a standstill, buildings were unheated, the electricity didn't work, and there were hardly any serviceable cars to be had.

Berezhtkov paused, smiled and suddenly said.

"But they're doing it, dammit! They're sky riding!"

The "Interviewer" understood his feelings and thoughts. How short, and yet how great was the distance between those years of economic chaos and the present night, when a Soviet aircraft with Alexei Berezhtkov's engine had been in the air for over two days and nights now on its non-stop circular flight to set a new world record.

How had that gulf been bridged? Would Berezhtkov be able to describe it?

Berezhtkov reached for the telephone again, but checked the impulse.

7

That epoch, as you know, went by the generally accepted name of War Communism, Berezhtkov continued. I remember the slogan that was so popular in the press, on the posters, and in speeches those days—"The Socialist Motherland is in Danger!"

People went off to the front in an endless stream. There was a shortage of bread in Moscow, fuel was scarce, many factories had stopped working and the trams practically didn't run. Yet those days stand fixed in my memory as a time of tremendous enthusiasm and creation! How many changes there were! The foundations of a new world were being laid! It was in those years, for instance, that the CAII—the Central Aero- and Hydro-Dynamic Institute was founded and named after Zhukovsky. An amazing time! We went hungry, but we were never down hearted. The Weltschmerz never clouded our brows. As a matter of fact we had never laughed so much before. I remember lots of funny things.

For instance, you should have seen us going to work in the winter on our motor-cycles. We had to use our legs



as skis and steer a passage through the snow-drifts. And they were some snow-drifts, I tell you! Even the centre of Moscow—Tverskaya and Kuznetsky Most—was snowed right under.

And for all that, I don't remember ever having felt cold on my motor-cycle. We had young blood in us and did not shiver even in the keenest frost. One only feels cold when one's old. And the whole of our new world was a world of youth. In those days I went about in the winter wearing a short sheepskin coat girdled with a broad army belt, leggings and a *papakha*\* which Ladoshnikov had given me as a present. The motor-cycle was my constant companion, participant and helpmate in all my adventures and romances. On a free evening I'd tear along with the wind in my face, young, happy, confident that I was going to do great things.

Before long I got an interesting new job. One fine day Ganshin turned up.

"Ganshin, are you going to sleep there all night?" Berezhkov suddenly broke off his story and seized his friend by the leg.

The latter turned over, revealing an extremely good-natured, snub-nosed, sleepy face, which fully answered Berezhkov's description. Ganshin sat up and peered round near-sightedly.

"What d'you want?" he growled.

"This is a night of story-telling. Here, let me introduce you," Berezhkov said, making the introductions "if I tell a lie, hold up 'a leg'."

"I hold it up beforehand!"

A leg in a brown trouser jiggled in the air. Berezhkov caught it and pulled it down, but it was up again. In an instant, everyone laughed. Ganshin was now wide awake. Tucking his feet up under him, he fished his glasses out of his pocket and began wiping them. Several hands with glasses of wine, cups of coffee, sandwiches and cakes were held out to him at once. He was obviously popular in that house.

\* *Papakha*—a tall fur cap.—Tr

Well, then, Berezhtkov resumed, one fine day this gentleman comes along and says, as usual

"Berezhtkov, you're wanted."

"At your service. What, where, when?"

"We need a chairman of the Technical Council at the Bureau of Inventions. We have to set up a council to examine inventions, give its opinion on them, and have them tested—in short, you're the man we need."

I was so fed up with the office work in the organizing department of the Motor Section that I immediately consented to take on the job as a side-line.

Future generations will probably be puzzled by that magic word "side-line." During the years of War Communism a person could hold a dozen different jobs. Anyone who had less than three or four was considered just a lazybones.

The Bureau of Inventions was located in the Ordinka, Zamoskvorechyé District, in a new, very tall and frightfully cold house. There, on the fourth floor, I occupied several rooms, complete with typists, secretaries and consultants.

I received applications, examined inventions, organized an experimental workshop, and tried to the best of my ability to assess, test and recommend every invention that presented the slightest interest.

The punching of tin basins and plates—a very useful job—was a third side-line of mine. The tin basin punching proposition was put through the Bureau of Inventions, where it was duly examined and approved. The "inventor" (in this particular instance I can't see the word without inverted commas) received a patent and a primitive little factory in Moscow for manufacturing his basins.

For some reason, however, the thing didn't work. The press turned out nearly a hundred per cent throw-outs. And no one could understand the reason why I boldly volunteered to solve the problem and went to work at the basin factory.

The first thing I did was to reconstruct the press. It turned out a strong pretty machine. But the moment I put it to work it tore the metal. I went over it again, but found nothing wrong with the design.

I turned the torn basins over in my hands and examined them. I noticed that the metal had what looked like an emery surface on it, and emery, as you know, causes tremendous friction. It puzzled me. We cleaned the press with kerosene, but it was no good. The basins still came out torn and seemed to be powdered with emery.

I began wondering whether there wasn't foul play here. Perhaps some scoundrel was dropping emery into the punch press on purpose? Then I got a brain-wave. I recollected that when red-hot sheets were rolled at a metal works they became covered with a fine scale. The moment we started drawing the metal under the press this scale came away and acted like emery.

So this was where the villainy lay! Inexperience, ignorance of the most elementary things!

But what was to be done about it? How were we to get rid of this emery? I fixed up a hydrochloric acid pickling bath and dipped each sheet of the metal in it before feeding it to the press. The result was absolutely flawless basins. The pickle ate the scale clean away.

Those punch-press tin basins were a great success at the time.

Looking back, I can't quite make out what the exact legal status of the basin and other similar little enterprises that sheltered under the wing of the Bureau of Inventions was. They were certainly not private enterprises, but neither were they entirely state-owned. They operated under some sort of patent rights and inventors' licenses. It sounds incredible these days, but at that time the basin "inventor" received his legal share of the produce in kind and sold it on the Sukharevka market.

Luckily, I got my pay at the factory in legal tender, and could sometimes afford the luxury of treating myself and my friends at the same market-place, where the chief dainty was sausage fried in boiling fat.

Today it is clear to us that all that basin business and sausage entertainment were so many loopholes for capitalism, which though banned and banished was nevertheless devilishly tenacious and hard to kill.

Do you know what occurs to me when I look back on all that? If capitalism had won out in Russia those days, I would have become a dreamer-failure, or at best something like that manufacturer of tin basins. You will see why as the story progresses.

9

*And so, Russia was hurtling onwards, rushing into the future, over the ruts and snow-drifts, like an aerosleigh racing over the snowy sweeps.*

And now, with your permission, I shall pass on to the tremendous epopee of the aerosleighs.

As I have already told you, that same old Ganshin came to me one day and said

"Berezhkov, come along!"

We mounted our motor-cycles and rode off at once to Zhukovsky's. It was in the spring of nineteen nineteen—around the beginning or the middle of May. It was about that time I think that the newspapers reported Yudenich's advance on Petrograd. The Communist Party again appealed to the army, the workers and the peasants, to all citizens of Russia, to exert all efforts on the war and home fronts in order to repulse Yudenich.

It was at this time that Zhukovsky received a letter from the Council of People's Commissars asking him to help create a new weapon for the Red Army—the aerosleigh.

We arrived at his little house in Milnikov Pereulok late in the afternoon. Professor Zhukovsky was sitting on the doorstep. He had his ink-well on the broad banister of the porch and sheets of paper spread round him, and was writing rapidly, forgetful of all else. He was catching the last lingering minutes of fading daylight, as the electric light was constantly failing, and he could not work in the light of an oil wick. He was already seventy-two, and his

eyes were not as strong as they had been. He now wore spectacles when he wrote. Next to him, on the doorstep, lay his huge opened umbrella, apparently put out there to dry after the recent downpour.

No bad weather could keep Zhukovsky indoors in the morning. There were hardly any tramcars running in nineteen eighteen and nineteen, and the cabs were nothing but a memory. Zhukovsky walked every day to the Moscow School of Engineering at Korovl' Brod, where he continued to lecture on mechanics and aerodynamics. In the winter he wore a bearskin coat and beaver cap, in the spring he turned out in his old professorial cape and wide-brimmed grey hat, and in rainy weather with his umbrella and large rubber over-shoes.

Despite his years, he worked a great deal and made new discoveries. Already over seventy, he experienced a new surge of creative energy with the coming of the Revolution. It was on his proposal and in accordance with his project that the Soviet Government passed a decision in December 1918 providing for the construction of the CAHI (Central Aero- and Hydro-Dynamic Institute). At the beginning one of the rooms in Zhukovsky's house—the former dining-room—was used as the Institute's Conference Hall, as we called it. It was there, in Milnikov Pereulok, on Zhukovsky's desk, that the first curricula of the future Academy of the Red Air Fleet, which now bears the name of Zhukovsky, were drawn up.

Exceedingly active, versatile, "almost a university," as one of his pupils put it, Zhukovsky those days was working on a variety of problems. He helped organize an Experimental Institute of the People's Commissariat of Railways. At the request of the railwaymen, Zhukovsky carried out a number of remarkable researches, such as the work "On Snow-Drifts," in which he investigated the path of a flying snow-flake and studied the nature of snow deposits on either side of a barrier. Ever since then snow-drift fighting has been done the "Zhukovsky way."

Old Zhukovsky served his country, revolutionary Russia, with fresh verve and inspiration.

We found him now, as usual, at work. He was sitting on the doorstep, covering sheet after sheet with writing. The front-garden was green and fragrant, and the lilac was beginning to blossom. We parked our motor-cycles and walked towards the house, jumping over the numerous puddles.

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Now friends, please attend. I'm going to tell you of an incident, which has gone down in the annals of aviation under the heading "Professor Zhukovsky and the Prim Maid."

These last words of Berezhikov's caused a stir of animation among the guests which I could not account for, but the speaker went on unperturbed.

In the path leading to the porch there was a big puddle. It baffled two little comrades—a boy and a girl, who stood before it, pondering how to overcome the obstacle. The children were about twelve or thirteen years old. They were dressed in similar grey coats and boots.

Zhukovsky went on writing without noticing them. The girl eyed him severely. She was altogether a very prim little person, as it afterwards turned out.

The noise of our motor-cycles had warned Zhukovsky of our arrival, and hearing us approach the house, he muttered, without tearing himself away from his work:

"I shan't be a minute. . . Go inside. The whole picture of aerosleigh gliding is clear to me, perfectly clear. I'll tell you all about it presently."

"Is there such a thing as an aerosleigh?" the girl suddenly said.

Zhukovsky looked up, somewhat startled.

"Is it me you want, children?"

"We are not children, Comrade Zhukovsky," the girl corrected him. "We have come to see you."

"Then go in, go in . . . er . . . comrades."

Here your obedient servant committed a terrible faux pas. Seeing that the boy had stepped into the puddle, making a bee-line for the doorstep, I made so bold as to

pick up that prim little girl and deposit her on the steps. My God, you should have seen the annihilating look she gave me!

The children then explained to Zhukovsky that they were delegates from an orphans' home situated close by, representatives of the Young Communists. The boy spoke timidly, obviously overawed by this meeting with the famous scientist. He kept glancing at his companion as though seeking courage in that quarter.

"Young Communists?" Zhukovsky said. "Interesting. Very interesting. What can I do for you?"

"We want to ask you to give us a talk on the beginnings of life on Earth."

"The beginnings of life? Frankly, I'm not very strong in—"

"That can't be," the girl interrupted. "You are a famous professor."

"My child . . . sorry, I mean comrade. I'll talk to you on the development of aviation. I know more about it."

"It's not only yourself you have to think of. In that case please lay particular stress on the question of Aviation versus Religion."

"I'll come and tell you how man flies and how he will fly tomorrow. And if the electric light doesn't fail, we'll make it a magic-lantern lecture."

"Oh, a magic lantern!" the girl exclaimed, then caught herself and became grave again. "But please don't go too deep into technicalities. Scientists these days should give more attention to the general world outlook."

Zhukovsky looked at the girl meekly, but there was a twinkle in his eyes.

"I'll do my best," he said.

The young delegates then made arrangements with Zhukovsky about the date and hour of his lecture.

Taking their leave, they nodded to him and flung up their right hands. It's interesting that a similar gesture was later adopted by the Young Pioneers.

Zhukovsky's face registered curiosity.

"What does that mean?" he asked.

"It's our salute," the boy said.

"We raise our hand over our head," the girl explained. Then with a serious look at Zhukovsky, she added, "That's to remind us always that the public interest is above the personal."

"I see!" Zhukovsky said, surprised, and also raised his arm, bent at the elbow. "Good-bye, comrades."

The children turned and began to descend the steps. They stopped for a second at the ill-starred puddle. The girl glanced at me quickly, blushed, and walked straight through the puddle with a resolute air, dragging her companion along. They walked to the wicket without looking back, but stopped dead in their tracks at the sight of our motor-cycles. Much as they looked down on technical fends, they could not bring themselves to go past these fascinating machines.

I winked to Ganshin. Seeing that Zhukovsky was deep in his work again, we were back at our motor-cycles in a flash. Sergel commanded the boy:

"Jump on. You'll show me the way to the children's home."

The youngster scrambled up behind him.

I plucked up courage to offer my pillion seat to the scornful maid. To my surprise she agreed.

The company laughed heartily at the story. Oddly enough, they kept glancing not at the story-teller but at his wife.

## 11

Guess how our conference started? Bereshkov queried. Naturally, it started with Sergel Ganshin expressing his doubts on a number of points.

Wouldn't we make a mess of the job? Was it our business to tackle production manufacturing—and of aeroleighs of all things? Did any of us have experience in industrial production? Soberly speaking, what sort of assistance could we give? Our business was to provide the design, the theory, the drawings, and calculations, we would even provide a model of the aeroleigh, but factory production, batch production, should be handled by some



Industrial plant. Would not that be more sensible? Besides, said Ganshin, we were all swamped with work and had more important jobs on our hands than we could cope with—the organization of the CAHI, for one thing, the building of new aircraft, the organization of an engine department, and so on and so forth.

The conference was held in the large warm kitchen Lenchka, Zhukovsky's daughter, had managed to make this the most attractive and cozy room in the big house, the major part of which was not heated during the winter. We all assured our host that there wasn't another room better suited for work and friendly talks than this "small conference hall" of ours.

The oval table covered with an embroidered table-cloth, the plush couch, the old grandfather clock in a mahogany case—all were hidden in the gloom of twilight. Our neighbourhood got no electric light that evening, and our meeting was illuminated by the fire from the kitchen range. Another source of light was a lamplion—a wick in a large saucer of oil, set on the table next to Lenchka, who was taking the minutes on sheets of lined paper torn out of some old exercise-books.

We sat next to the range, on which a kettle was already humming, promising us soon a glass of hot tea. It would have been stuffy but for the open window, through which the cool fresh air smelling of damp earth poured in from the garden.

Zhukovsky sitting on the couch turned sideways to Ganshin as the latter went on propounding his irrefutable arguments, took a handkerchief out of his pocket and let it dangle in his hand. This was a sure sign that Zhukovsky was annoyed. One could not see his face in the uncertain light, but we all noticed the movement of the hand with the white handkerchief in it.

Ladoshnikov sat on the floor right in front of the fire, and seemed to be completely absorbed in his duties as stoker. He was feeding dampish birch billets, bits of plywood and boards into the fire, doing it dexterously. He raked the fire with a poker, then peeled off some birch bark and tossed it into the flames. It coiled up and burst

into flame immediately, throwing dancing lights on his face and hands, which were covered as usual with small scars and scratches. It so happened that Ladoshnikov looked after his teacher's needs during those years of hardship. A man of simple habits, who sought no privileges for himself, he got a special food ration for the Professor, received and carted down firewood for him, which he sawed, chopped and stacked out in the yard, and sometimes he would even come lugging in a bundle of wood splinters from the CAHI workshops.

He now sat there staring into the fire. His face, lit up by the flames, looked strangely unfamiliar. He seemed to be smiling. Yes, the faint shadow of a smile flitted over his face every now and then. I couldn't be mistaken. Or was it the effect of the dancing flames?

Ganshin meanwhile went on speaking, producing ever new arguments. Gusin, that effusive lovable old "Goosy", of ours, who sported those days a shaggy sweater and huge "Austrian" boots, kept jumping up, trying to interrupt the speaker. But Professor Shelest, who presided over the meeting at Zhukovsky's request, invariably pulled him up and called him to order.

When Ganshin had finished, Shelest called for silence and began speaking himself. In a tone of faint mockery, he began in his usual witty manner:

"I can predict fairly accurately what will happen if we take the advice of our honourable friend Ganshin and turn the aerosleigh order over to some factory. That factory is bound to have a Ganshin of its own. And do you know what that Ganshin will say? 'Comrades, I have serious doubts,' he will say. 'I'm afraid we'll mess up the job. Is it our business to tackle this thing? Why should we build something we haven't designed ourselves?'"

Shelest's sarcastic speech was greeted with laughter. He went on to prove that this hypothetical factory Ganshin would propose, solely in the interests of the job, to send the government's order back to Professor Zhukovsky and his pupils, who had designed the aerosleigh.

"As a result," he said, "the army will have no aerosleighs. We have very little time left until the first snow,

until the winter. I propose, therefore, that the doubts of our esteemed colleague should be filed away for future reference and that we should start building aeroplanes ourselves. And build them in good time too."

Thus, wittily and conclusively, was Ganshin defeated. But the worsted sceptic did not take it very hard. He ended up by acknowledging his defeat with the best grace and joining in the general laugh.

12

Zhukovsky was pleased

But there was something wrong with Ladoshnikov. It was a remarkable thing. Only a minute or two before he had been smiling, and now when everyone else was laughing, he sat there without the shadow of a smile on his face. Sat tossing bits of plywood and birch bark into the fire and watching them roll up from the heat.

"Mikhail Mikhailovich, what is your opinion?" Zhukovsky asked him.

Ladoshnikov turned his head, stared at Zhukovsky in utter silence, then stood up quickly.

"I'm sorry, Nikolai Yegorovich," he said. "I missed the whole thing. I was thinking of something else."

"May I ask what exactly you were thinking of?"

"Don't be angry, Nikolai Yegorovich. I've just hit on a thing I've been cudgelling my brains over for a long time. I know now how to make a strong construction out of plywood. A tubular construction—that's the answer! Light plywood tubes. Like the tubular bones of a bird."

Zhukovsky could not find it in him to be angry with his favourite, especially at a moment when the latter had stumbled across a happy solution of some engineering problem. Ladoshnikov at that time was teaching at the training courses for Soviet pilots. These courses, the first in the republic, had been organized in 1918 with Zhukovsky's co-operation. But the chief thing in Ladoshnikov's life was the CAHI. Together with other pupils of Zhukovsky he had worked on the project for this aircraft research institute, and when the govern-

ment had approved it, he went every day, almost at the peep of dawn—and in winter when it was still dark—to the new Institute's premises where an experimental aircraft construction department had been set up.

He had no need now to lure himself out to some huckster and live on the miserable sops he gave him. He was building his new aircraft not in a wretched little workshop set up in the corner of a freezing-cold alrashed, but in an aviation research centre, which, despite the desperate straits the country was in, the young Soviet Republic was supplying with materials, funds and fuel. Adapting himself to existing conditions, he was working on the construction of a light swift service airplane that would be easy to produce from simple available materials. Simultaneously he carried out various researches at our old aerodynamic laboratory.

"Interesting," Zhukovsky said. His voice had lost its edge. "Very interesting. We'll go into that some other time. Meanwhile I can inform you that this conference has unanimously"—he glanced at Ganshin, who nodded embarrassedly—"has unanimously decided to go ahead with the construction of aerosleighs for the Red Army."

"Quite right. I support it. But personally I'm going to work on my airplane, Nikolai Yegorovich."

"Of course you are. But just now we are concerned with aerosleighs. What interests us is your participation in the job."

"But I can't, Nikolai Yegorovich. I'll be too busy."

Zhukovsky said nothing. In the semi-gloom of the kitchen we saw his portly figure, his patriarchal white beard and high dome shaped forehead. The handkerchief, which he was holding by the very end, came into motion again.

This time no one attempted to restrain Goosy. He jumped up and cried.

"What did you come here for then? You and I are the inventors of the aerosleigh, aren't we? You and I were the first men in Russia to ride in an aerosleigh. If you give it up, then who do you expect to believe in it? What did you come here for, I'd like to know?"

"Consider me absent, then "

Ladoshnikov went up to the table, glanced at the list of those present, which the secretary had neatly made up, took the pencil out of the hand of the astonished Lenochnka, and crossed his name out

"I've invented all kinds of things," he muttered "The amphibian, too, if it comes to that ... But I was never tied down to it."

Zhukovsky found his voice at last. He spoke up in a shrill falsetto, a thing that only happened to him when he was highly indignant

"So you think you have the right to consider yourself absent at a time when the country is in such difficulties?" he demanded.

"Nikolai Yegorovich, for the first time in my life I have a chance of doing what I want to do "

"Ah You imagine these great events in the history of our country have taken place only so that you can have a chance to construct what you want What grounds have you for believing that? On the grounds of your talent? But talent, my dear sir, is an obligation! An obligation to the people!"

Zhukovsky broke off his tirade, paused, then suddenly added in a gentle tone.

"You must help the comrades, you know Don't worry, you'll have plenty of time left for your airplane "

All of a sudden Ladoshnikov burst out laughing He picked up the pencil and wrote his name in again in a clear bold hand, putting the initials "M.D.S." at the end of it. Lenochnka asked him what they stood for

"My Dear Sir," Ladoshnikov answered, and laughed again

"Look here, Mikhail," Zhukovsky uttered amicably, "why shouldn't you rig up an aerosleigh of your tubular construction? Let's consider the aerosleigh just the wingless fuselage of an airplane. Let's see what sort of showing your plywood tubes will make there, eh? What about some tea, Lenochnka?"

Lenochka began to pour out the tea. Zhukovsky glanced at the open window and inhaled the spring smells of the garden with pleasure. He said, smiling:

"Those youngsters from the orphans' home were very nice. The young lady is so serious. What was it she said? 'The public interest is above the personal.'"

He raised his old man's hand slightly above his head.

That evening I copied out Zhukovsky's maxim in my book of favourite aphorisms: "Talent is an obligation."

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That was how our committee came into being. It was called the Compass—Committee for the Production of Aerosleighs.

I was included as a member, too, and took part in the discussion of a multitude of organizational and technical questions, put forward all kinds of proposals, and sometimes missed meetings when I was too busy with other affairs—in short I only helped in an offhand sort of way.

A month or two after the Compass was founded, Ganshin popped up again with his usual war-cry:

"Berezhkov, we're in a fix! We need you badly!"

I may tell you, by the way, that Ganshin had gradually worked up quite an enthusiasm for the Compass. You know that kink of his. If I'm not mistaken he starts by doubting and being a wet blanket, then climbs down, and ends up by throwing himself headlong into the business.

We went to attend a special meeting of the Compass. Everyone there quarrelled with everyone else, the way people usually do when things are not working out right. But one thing was clear. The aerosleigh, as I have already mentioned, was invented by two friends, two Russian designers—Ladoshnikov and Panteleimon Gusin. Gusin was one of Zhukovsky's most gifted pupils and a prince of good fellows. As I said, he was an inventor, but one of the kind that ought never to be allowed within a mile of any workshop. Before they've had time to build

anything there he'll hatch up new ideas and come running in, tearing up the drawings and slipping others in their place. That is exactly what happened in the case of the aerosleighs. Naturally, nothing came of it.

In the end it was decided that a head designer was needed to take charge of the work. This post was offered to me. I said I would study things on the spot and give my answer the next day.

The next morning I went to the workshops—I had already been there before.

The place was unbearably cold and topsy-turvy. I found Gusin there, wandering about among the benches, snatching tools out of the workmen's hands, and starting to saw and plane away at something.

At first glance things looked pretty hopeless. But I'm a born optimist, and always believed that there were no difficulties that couldn't be overcome.

That evening, at the meeting of the Compass, I declared that I would undertake to organize production of the aerosleighs provided I had full trust and undisputed authority to do as I pleased in the workshops. Despite Gusin's protests, my terms were accepted.

The committee decided to remove Gusin from the production end of the job and authorized me to take whatever decisions, technical and organizational, I thought necessary. I was appointed director of the Compass works.

This was my first full-responsibility job. This experience, when I had to answer for everything myself, making mistakes and mending them, was for me a real school of life and engineering. The Compass was more than a school to us.

What a significant word—Compass—Isn't it? For me, both the word and what it stood for were an actual compass, for me, who did not know myself yet, did not know what I wanted and what I was capable of, it was like a magnetic needle pointing and saying, as it were—here, this is your way!

I didn't realize that till much later, though, not until after many events of which I shall tell you in due course.

And now let me tell you this, in case you don't know it. Ever since a boy I was not only an inventor, soaring above earthly level, but a man who could handle the practical side of things.

I had been through the mill of experience with Zhukovsky long before the Wood Glen affair. With our own hands we—several students and members of the aeronautic club—together with Zhukovsky, had built his aerodynamic laboratory. We had sawed and chiselled, worked as fitters and carpenters, making things out of wood and iron. Every piece of the equipment was made by us.

Whenever I visit the premises where Zhukovsky's laboratory now grown out of all recognition, first come into being a rush of feeling comes over me at the sight of some of the fittings and things I had made myself. To think that hundreds and thousands of students, now aviators and aircraft engineers, had passed through this laboratory where you had once been planing boards and driving in nails!

After that came the Adros engine episode I already told you about. Let me mention by the way, that that 300 h.p. engine was by no means buried and forgotten after the downfall of Podraisky and the break up of Wood Glen. It lay in the tool shed of the School of Engineering, and for two more years Ganshin and I would crank it up once in a while. After sweating at it till we were red in the face, we'd get it to run, belching thick smoke so that you couldn't see a thing in the shed, and then after a few minutes, having made a hundred or a thousand revs, it would conk out again.

We would repair it and start it up again, like martyrs. It was wonderful exercise, by the way, and we developed biceps like a couple of heavyweight champions.

That's the school of designers for you! You've got to feel techniques not only in the laboratory, in text-books and in drawings, but on your own hump and in your muscles.

The tin basins, piddling though they may have been,



taught me a lot too. That was not a bad school either—my first school of experience in mass production. Basin punching made me realize that mass production was not a thing to be trifled with. Just you start taking liberties, getting nervy or making mistakes, and the whole batch of some thousand pieces is ruined.

But aerosleighs are not basins. I was entrusted with a responsible military assignment, a new factory production. It was here that my flair for practical matters asserted itself. It was brought home to me that a designer's concern was not just with blueprints and projects alone, but with manufacturing as well, with the thing in the metal and its subsequent fate. You will see, further on, what a tremendous part this realization played at another critical period in my life.

And so it was that through a number of happy circumstances attending my career I became alive to the fact that this country would be transformed into a great industrial power not so much by inventions as by factories, a multitude of factories, by mass, batch production of machines, that we did need imagination, dreaming, the performing of miracles, but they had to be miracles on a batch production scale.

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My first order at the workshops was this: no improvements, no changes in the blueprints until the first batch of aerosleighs had come off the premises.

I think the most difficult and painful test of will-power for the designer is to hold out against the temptation of trying to improve on a design after it has passed into the manufacturing stage.

That good fellow Gusin continued working in improvements almost every day, some of them devilishly tempting. I was chockful of brain-waves, too. I saw in imagination new and staggering designs for aerosleighs, sometimes I'd catch myself tracing sketches and I'd tear them up or hide them away. This was doing things with a vengeance. I wouldn't let anybody, myself included, make

any alterations until the first batch of ten machines which we were building for the Red Army was completed.

This was the tempering period of my life as a designer, as it were. Sometimes I dream of writing a book entitled "How the Designer's Spirit was Tempered."

And would you imagine it, we got the job done inside of a month just when the first snow fell. We put out ten aerosleighs—ten very faulty machines without brakes, with poor Hall Scott motors, but nevertheless machines you could ride on, though they were damnably hard to stop.

Now I can fully appreciate how right I was. Only now when I am head designer of a plant that builds aircraft engines, do I realize what it means once you begin to waver, to let difficulties get you down, to incline to the idea that this thing were better dropped and a new engine built in its place—"to switch over" to a new engine, I call it. Once you succumb to this temptation you can count your engine done for and your reputation as a designer ruined. Your plant, too, will go to the dogs.

I worked in the former stables of the high-class restaurant till twelve or one o'clock at night, then I got on my motor bike and rode home, tired but happy. Shortly afterwards I moved over to the Compass altogether, selecting for myself a small room in the basement next door to the boiler-room (for the sake of warmth), and I didn't come home for nearly six months.

I remember composing quite a poem under the title of "Compass." Unfortunately it got lost.

I'll give you the events in chronological order, as I promised. Berezhkov went on. We didn't dare to turn over to the Red Army that first batch of aerosleighs we had built early in the winter of nineteen nineteen—it would have been criminal to do that—but we started production on a second lot of somewhat improved design. Mean-

while, we members of the Compass tried out the aerosleighs at our own peril and, I must say, with no little enthusiasm. We drove them about all over the town, eliminating faults, and often having breakdowns. Sometimes, as I believe I have already mentioned, we had to get horses and be dragged home ignominiously.

Well, it was on one such sleigh that I drove the member of the RWC I'd just like to remind you of the events that led up to it.

And Berezhkov gave me a brief summary of what I already knew: how Professor Shelest, the chairman of the Compass, had picked up the telephone, and how a change had come over his face, how a gloom had been cast on the whole meeting; how Shelest, with a humorous twinkle, had exclaimed, "Why, we've forgotten that we have Berezhkov", how the Compass members had been busy all night with the aerosleigh chosen for the trip, and how the propeller had snapped in coming through the gate.

We started from Kutafya Tower about seven a.m., Berezhkov continued. Passing Serpukhovskaya Square and Danilovka, I slipped safely through the narrow passage under the bridge of the Moscow circuit railway, and drove out on to the Serpukhov High-road, as I was told to do. There was a sharp frost under a clear sky. A reddish sun with no glare to it rolled out to meet us. The sleigh glided over the wide deserted road. The few scattered factories at Upper and Lower Kotli dropped behind. Here and there a solitary factory chimney could be seen smoking. The others showed no signs of life. The country was disorganized at that time, there was a shortage of fuel, and a great many factories were at a standstill.

The sleigh raced easily over the wide empty road. Beyond Upper Kotli, as every Moscow motorist knows, there is a very steep slope.

Shooting up over the brow of the hill, I saw a long train of carts moving up towards us. When almost level with them, I calmly swung the wheel round to pass the train on the right, but at that very moment the horse in

front caught fright at the sight of this flying monster with the swiftly revolving propeller gleaming in the sun (the propeller as I mentioned, was mounted aft, but its long brass tipped blades, which merged in a shining disk when they revolved, could be seen from the front, too) The frightened horse shied right into my path.

I couldn't put the brakes on—they were unreliable. I swerved and opened out the throttle. With a roar the engine put on a burst of speed. I made a sharp turn to avoid the frightened horse. The right runner slipped and hung over the ditch. To righten the sleigh I lunged myself over to the left side, and in the same instant, Ganshin quick to realize the danger, threw himself on top of me. The sleigh heeled over, the right runner hanging in mid-air for several breathless moments.

It was all over in two or three seconds—true, they were intensely wild, as they always are in moments of danger—and then we were back on the road again, gliding along as if nothing had happened. All of a sudden I felt a hand patting my shoulder. I looked round and saw the black twinkling eyes of our passenger. He leaned towards me and shouted into my ear above the roar of the engine.

"Bravo! This is the first time I've flown."

I felt elated.

We passed several villages and started downhill again. We always had bad luck with hills. Where there was a hill there was sure to be trouble for us.

I started down, braking in rather an original way—by edging one runner into the snow rut with the other cutting through the loose snow along the roadside. Going down we overtook a shewbald horse drawing a low country sledge. The bearded driver stared agape at our machine.

We glided along slowly. A village came into view at the bottom of the hill. Smoke curled peacefully above its snow-covered roofs. The sky was a lovely blue. Then all of a sudden .

I heard an ominous sound. A dry hard snap. The machine began to wobble, and simultaneously a loud howl went up behind us.

Cutting off the motor, I brought all the brakes into play and edged both runners into the roadside—the brakes worked to some extent in the loose snow—and after being carried along for about a hundred yards we managed to come to a stop.

Looking back I saw an odd scene. The sledge driver, waving his arms wildly and yelling at the top of his voice, was dancing around his horse, which lay still in the snow. I noticed also, to my horror, that one of the blades of our propeller looked rather queer: about a third of it was missing, and in place of the gracefully rounded tip there was a torn and jagged stump.

What the devil! We had been riding carefully and hadn't grazed anything that I could think of, yet the propeller was gone!

I got out, took a look round, and saw a gleaming object lying in the road near the horse. It was the broken piece of our propeller. But I saw something else besides. The driver was running towards us, waving his whip and shouting.

We gathered from his yelling and cursing that our propeller had killed his horse. It appears that when we had started slowly downhill the driver had been curious to get a closer look at this rum gadget that had slipped past him, and had whipped up his horse to overtake us. The propeller mounted at the back of the sleigh became a transparent shining disk when it revolved, and to an inexperienced eye was almost invisible, especially against the sun. On getting a taste of the whip, that poor devil of a horse had started downhill at a trot, caught up with us, and run its head under our propeller.

I glanced at the member of the RWC. He had the rear door open and sat with his body half-turned towards the bearded driver. He answered my look with an exclamation, "Of all the crazy accidents!"

The driver shouted that the horse was the only one he had, that it had been given him by the Committee.

of the Peasant Poor when they were dividing up the gentry's property, and that he might as well go hang himself with the reins in the forest than live without a horse.

At his cries people came running out of the nearby cottages. Things I saw, were beginning to look ugly.

I pressed Ganshin's hand and whispered

"Let's get away at once!"

But this was easier said than done. How were we to get the motor going with a piece of the propeller lying in the roadway? Everyone knows that a propeller out of balance causes tremendous wobble in the power plant, and the engine, in such cases, is liable to be thrown out of gear. Nevertheless I gave the order:

"Ganshin, start up!"

"What d'you mean? How can I?"

"Start up! Can't you see what's going on?"

Ignoring the shouts and questions coming from the crowd, I went back to my seat with an air of determination, but was checked by the member of the R.W.C.

"What are you going to do?"

I answered hastily

"I hope we'll be able to get the machine started down hill. We'll put a couple of miles between us and this place and then take the lay of the land."

The member of the R.W.C. regarded me with a puzzled stare. Then suddenly his swarthy face, nipped by the frost, took on a deeper shade of red. His blood rose in a jet of anger. But before I realized it, my attention was diverted by another event.

It appears that Ganshin, seeing two pairs of *valenki*\* sticking out from under the aerosleigh, had promptly grabbed them, dragging out two urchins, who, taking advantage of the hubbub, had crawled under the queer machine to poke about among the works.

The boys started bawling; the murmur of the crowd at once took on a threatening note; a voice rose above it, insistently suggesting that we should be relieved of our

\* *Valenki*—felt top-boots.—Tr

fur coats by way of indemnity for the killed horse. The idea, I noticed, appealed to the crowd, who thought it quite a business-like proposition. I shouted out again

"Ganshin, start up!"

"But what about the horse? What about this fellow?"

"Start up!"

At this point the member of the R W C. threw off his sheepskin coat and jumped out of the sleigh. He stood facing me in the long greatcoat of a cavalryman and a Budyonovka helmet. There is an expression "His eyes blazed." Well, I never realized what that meant until I saw the angry flashing of his huge black eyes, before which my own dropped.

"How dare you?" he shouted "To go sneaking off like that! You ought to be ashamed of yourself! How can you!"

He was deeply shocked, and everything about him—his head, slightly thrown back, the set of his lips, which had suddenly hardened with hostility, and even the curved nostrils of his nervous aquiline nose—expressed this surge of angry emotion.

"How can you be like that?" he continued "Haven't you any human feeling, any sympathy for a fellow-man?"

I listened shamefacedly. Ganshin made excuses for me.

"Comrade Commissar, you've got to bear in mind—"

"What?" the latter snapped

"That he's responsible for the outcome of this trip. And for your safety, too, Comrade Commissar."

"There can be no excuse for sneaking away!"

He broke off the conversation abruptly and turned towards the peasants standing near the aerosleigh.

Meanwhile the temper of the crowd had undergone a change. They had heard the way this military man had spoken to me, and it was quite enough to silence the threatening murmur. The bearded fellow who had lost his horse stopped waving his whip about and went up to our passenger noticeably calmer.

I stood staring gloomily at the sleigh. How was I to get it moving again? Could it be that there was no way

out? I examined the propeller. No, there could be no question of continuing our journey, not unless we could think up something miraculous.

Shortly our liaison motor-cycle came along. The shivering lad sat on it, holding under his arm the fragment of the propeller, which he had picked up in the snow.

"That's him!" Berezhtkov suddenly exclaimed, pointing to one of his guests, a blue-eyed fair haired man of about thirty or thirty two with a delicate, almost girlish face. It was the man in the blue suit whose strong manly handclasp had so surprised me earlier that evening.

"I'm afraid I've forgotten to introduce him," Berezhtkov continued. "Fyodor Nedolya, my friend, and now my first assistant in the design office."

The latter said nothing, but his face turned a faint pink.

"There he goes again, blushing!" Berezhtkov laughed. "If you only knew how he blushed when he was a kid."

During the Compass days, Berezhtkov went on, he and I built a three wheeled car with a motor-cycle engine and a plywood body. And would you believe it, the thing actually ran about! I called it "big-bellied Bertha," but Fyodor never once uttered that name and always blushed when I used it for our wonder-baby. He was fifteen then, and worked with us as fitter apprentice, and was a smart lad of an extremely inquisitive bent. I had moved my Adros over into the workshops and once in a while I would give her a crank up. This three hundred horsepower engine fascinated Fyodor. Many an evening after work, either with Ganshin or myself, and eventually on his own, he would take the Adros to pieces and put her together again, or turn various parts for her on the lathe in his spare time. Sometimes he'd sit up with me in my boiler-room sanctum at the Compass till midnight, listening to my fantasies, and once or twice he showed me his own drawings with a blush. He had invented a stun-



ning Oh, all right, Fyodor, I won't. D'you know what you looked like that day, when you got off the motor-bike, holding the broken piece of propeller under your arm?

Let me describe him to you, my friends. He was wearing black puttees, which made him look splendidly, and huge soldier's boots several sizes too big for him with raw-hide leather laces. They were very good for cold weather though, when you had to wrap your foot up in a newspaper or a bit of cloth and then slip it into a warm knitted sock before putting the boot on. Fyodor nevertheless got chilled through. The army greatcoat, altered to fit him, didn't give much warmth, of course. His short little nose, highly coloured by the head wind and the cold, which he kept wiping—excuse me, Fyodor—rubbing I mean, with a thick mitten, peeped out from under a padded Budyonovka helmet obviously too big for his head.

That was how our Fyodor Nedolya looked those days! Getting off the motor-bike, he glanced at the smashed blade, then at me, and ran up to me eagerly holding out the fragment of the propeller as if he expected me to stick or sew it on again. You could tell by his eyes that he actually believed I would rise to the occasion, think of some way out.

But the situation was hopeless. In reply to all Fyodor's questions, I just swore under my breath. To keep the engine warm we wrapped it up in blankets, which we had taken with us. I looked a picture of misery. There was no hope of continuing our journey.

Meanwhile our passenger was carrying on a lively conversation with the people who crowded round him, asking all kinds of questions. I didn't dare even to listen to what he was saying. A single thought was worrying me—how to get moving.

Fyodor was standing by awaiting my orders. He stamped his feet—either with cold or maybe with impatience—and kept glancing up at me with those trusting eyes of his, waiting, expecting me to say at any moment, "Come on, do this or that."

But there was nothing I could do! The only thing was to send him back to Moscow on his motor-cycle with a message about this damnable accident. My tongue refused to issue the order. It meant disgracing our work, our sleigh, the whole of our Compass in the eyes of the R.W.C. member. And what of these people, the peasants, gathered here? To them this wonder-sleigh was something in the nature of a symbol of the revolutionary city of Moscow, of the new world! What a rotten lookout, damn it all!

Then suddenly I got a brain-wave. What if I broke off the other blade, sawed off a similar piece? Wouldn't that balance the propeller? I doubted it, though. Such experiments, as far as I know, had never been made before. But what of it, why not try?

The next instant, with my characteristic ardour, I was absolutely convinced that I had hit on the only possible solution and was perfectly sure of success.

"Fyodor!" I shouted. "Get a cross-cut saw from somewhere as quick as you can!"

"What for, Alexei Nikolayevich?"

"Hurry up. I'll explain afterwards."

But Fyodor had guessed already.

"To balance it?" he said.

"Yes. Make it snappy!"

Fyodor was off in a flash. The member of the R.W.C. looked round. I went up to him. I still felt embarrassed after those sharp angry words of his.

"Comrade Commissar," I said, "we'll do something to the propeller in a minute, and I hope we'll be able to drive on in a quarter of an hour or so."

"Drive on? As far as I know, you can't drive with such a propeller, can you?"

My head flew up.

"We will! And we'll get where we want to go."

Our passenger regarded me again closely, as if taking fresh stock of me. A look of interest crossed his face, a face that betrayed the inner workings of his mind with such astonishing vividness.

"Well, well, we'll see how you manage that," he said.

While waiting impatiently for Fyodor, I went up to the motor and thrust my hand under the blankets, feeling anxiously whether it had cooled.

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I waited nervously for Fyodor. At last he came running up with a saw.

I climbed up on the motor. Fyodor stood below, and we started sawing off the sound blade to make it level with the broken one. We had to saw through the brass sheathing, and once the saw slipped and grazed my fingers. They began to bleed, but in the heat of the moment I felt no pain. After working like the devils we got through the brass at last, and reduced both propeller blades to a similar state of mutilation.

"Get in, please," I said to the member of the RWC.

He looked at the propeller and shook his head doubtfully.

"Please get in," I repeated firmly. "We're going to start." Secretly I thought, "What if it doesn't budge?" But my gesture of invitation was none the less confident.

The blankets and the sheepskin coat were taken off the engine. Our passenger pushed the bearded peasant lightly into the sleigh and got in next to him with a cheerful air that seemed to say everything will be fine.

I took my place, too. Ganshin took his by the propeller. It was now touch and go. I shouted

"Let her go!"

We usually cranked up this way. Ganshin would jump up, seize the top of the propeller, and pull it down by the weight of his body, making a quarter of a rev, then, straightening up, the second quarter, shouting out, "Contact!" I'd answer, "Contact!" and give her the gas. The engine would either start up or she wouldn't. To tell you the truth, nearly a hundred times out of a hundred she wouldn't. We'd then do it all over again, shouting back and forth, "Contact!" until she finally started spluttering

On this occasion we had the devil's own luck. The engine was still warm and cranked up immediately in a rollicky sort of way.

The air was shattered by ear-splitting detonations, and the crowd fell back instinctively as they would at a machine-gun burst. I carefully slipped the engine into gear and ran the sleigh downhill.

It smoothly gathered speed. The little boys ran after us wild with delight. Ganshin swung himself into the moving sleigh and took his seat next to me. I gave him the "thumbs up" sign, with us mechanics that means "good egg," "top hole." The propeller was balanced. I kept opening out the throttle. At one moment I glanced back over my shoulder. They were all looking at us. In front of the crowd, one hand on the handle-bar of his motorcycle, stood Fyodor in his old little army-coat. The out-sized Budyonovka was pushed back over his head to keep the big cloth peak out of his eyes, and he gazed ecstatically at the spinning propeller, whose shortened blades were already merging into a transparent shining disk as the sleigh retreated.

The eyes of the member of the R.W.C. looked friendly again. Evidently he had cooled off. He nodded approvingly, and, turning back the collar of his sheepskin coat, shouted something to me, smiling. I could tell by the movement of his lips that it was a single word, but the roar of the engine drowned it out. It seemed to me though—I can't be sure of it, of course—that he had shouted, "Contact!"

My face back at the wind shield, watching the snowy road rushing towards us, I shouted back at the top of my voice, "Contact!"

Ganshin glanced at me suspiciously, but said nothing.

The speaker broke off, went over to the window and gazed at the nocturnal city with its twinkling lights. Then he swung round and said

"I'll try to recapture the mood of that moment."

Ahead of us, he went on, lay a wilderness of snow. The dazzling white waste made your eyes smart. The fellow with the beard had got off at some big village. The member of the R W C had gone to the local executive committee with him and returned to the sleigh.

We raced down the Serpukhov Road over the hard-packed snow. Now and again the monotony was relieved by fleeting glimpses of cottages, smoking chimneys, or a strip of forest, which loomed darkly in the distance, then suddenly closed down upon the roadsides, stretching shaggy fir paws or bare branches over the swiftly gliding sleigh. And then the open spaces again, the sweeping snowy Russian expanses with their faint shadows of snowed-up gullies and brooks, and a little village nestling in the snow nearby.

With my eye on the road ahead of me, I drove the sleigh, listening to the motor, feeling the pulsation of the propeller, judging the speed with a practised eye, and only in those rare moments when my gaze travelled away into the distance did it suddenly strike me—this is her, this is Russia.

The factory chimneys of Serpukhov came into view. This meant we had done a hundred kilometres. Wasn't this sleigh of mine a dandy! It hadn't let me down after all!

Little houses appeared on either side. I eased off, and the sleigh glided slowly down the wide high street. On one side stretched the railway tracks and you could see trains of red box-cars, the old station with its signs in pre-revolutionary spelling: "This way to the platform," "Boiling Water," then the massive stone building of the station itself. It was decorated with fir-branch festoons and red bunting with slogans in celebration of the recent second anniversary of the Great Revolution and with appeals to help defeat Denikin. Lenin looked down from a large portrait.

Some military unit was entraining. The station square was crowded with waggon, shell bogeys, guns and field-kitchens. A young soldier, sitting on bales of pressed hay, was playing an accordion with gusto. Someone below

was evidently dancing, but we could see nothing of it because of the men's backs, tall fur hats and Budyonovkas which shut off the view.

At the noise of our engine all faces were turned to us and the accord on player, I believe, stopped playing to stare at the roaring wonder-sleigh Ganshin and I immediately put on a dignified air. We would have given anything just then to scorch past, leaving a whirl of snow-dust in our wake! But instead I had to brake as hard as I could. It was touch and go whether we would pick our way through safely.

Luckily the member of the R.W.C. touched my shoulder and pointed to a side street. Following his directions I drove the sleigh out almost to the edge of the town, and at a sign from him, drew up at a detached villa of white stone.

Several saddled horses stood hitched to the railings. He told us to wait and went into the house.

Our crippled propeller, which had served us so faithfully, continued to revolve. I could feel the machine quivering, and I experienced an inward tremor, a thrill of joy. How splendidly everything had come off! We hadn't disgraced the Compass. Placed in such a predicament, I had managed after all to find a way out, and bring the member of the R.W.C. safely to headquarters. I did not feel a bit tired, and was all eagerness to get another assignment and race on further.

But we had been told to wait. I opened the door and looked round. A column of Red Army men was crossing the street two or three blocks behind us. They were swinging along in serried ranks, with rifles glinting across their backs and the flaming silk of the colours floating overhead. They were obviously marching to a song, but the roar of the propeller drowned it out.

Suddenly Ganshin gripped my arm.

Our passenger was coming towards us, smiling amiably.

"I say, comrades, could we continue our journey to Tula?" he asked.

"Tula? Like a shot!"

"Fine. Have a bite first. Be ready in two hours."

Accompanied by an orderly sent to show us the way, we rode up to another house and parked the sleigh in the yard, giving our motor at last a well-earned rest. Just then Fyodor came riding up on his bike. We wrapped the motor up in blankets and rags, then went inside to have something to eat. We were served a royal dinner—beef *shchl*, and a plate piled high with delicious buckwheat porridge. For dessert we had real tea with real sugar.

After dinner, worn out by excitement and lack of sleep, we climbed up on to the shelf of the huge Russian stove and fell asleep instantaneously. At the appointed time we were roused by the command, "To horse!"

Gay and cheerful, we started cranking up, but there was nothing doing. Our engine might have been a dished-out pumpkin for all the popping we could get out of it. We opened the carburettor, and found that it wasn't getting any petrol. We had fixed up a separate little tank with ether for starting. We opened this tank, unscrewing the nuts and the pipes, working in the frost with bare hands. It turned out that the ether (which, as you know, absorbs moisture like anything) was saturated with water, which had settled at the bottom of the ether tank and got frozen there, choking the pipe.

As you can't heat ether up by fire, we boiled some water and tried to thaw the tank with rags dipped in hot water. The water went cold at once. We ourselves were freezing and our hands were numb with the frost.

The member of the R.W.C. came up to the sleigh several times and watched us fussing around the engine. At last he lost patience, and said he would go to Tula on a locomotive. We felt terribly put out. But he took leave of us in a very friendly way without so much as a hint about the incident near the village where I had made him so angry.

We messed about with the rags and hot water long after he had gone, still hoping that the motor would revive. But it was no use. When it began to get dark I

started up the motor-cycle. Fyodor got on behind me, and we raced back to Moscow to send another aerosleigh down to the rescue.

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Shortly afterwards we put out a second improved batch of aerosleighs (this time with workable brakes) and handed the ten machines over to the Red Army with due solemnities.

This first squadron of aerosleighs was manned by armoured-car crews—all of them front-liners. In our opinion they went specially out of their way to find fault with the machines. In fact, the commander of the group, a young Ukrainian workman, had been dubbed "Death to Berezhkov." The new owners walked round the machines, cranked up the engines, tested all the mechanisms, and made trial runs. Sometimes the sleighs got stuck in the snow-drifts or turned turtle when taking sharp corners, and then they'd start calling curses down on our heads for faults in construction.

Before long we saw this crew off to the front at Perovo railway station, near Moscow, and helped them to load the aerosleighs on to trucks coupled to an armoured train. The commander known as "Death to Berezhkov" kissed me at parting.

"Thanks," he said. "We'll write to you. Some day, maybe, we'll meet again."

This gratitude more than rewarded us for all the hard work we had put in, for the daily grind, the petty plaguing troubles, the arguments, conferences, quarrels and vexations—all that goes to make up the working day of the designer engaged in the development of his machine, that never-ending process that is sometimes enough to drive a man crazy.

We stood on the platform, seeing our sleighs off. The engine whistled. Slowly the armoured train pulled out, bound for the front. The heavy cars built at the Moscow Hammer and Sickle Plant, rolled past with gun barrels sticking out of the hatches, followed by open trucks cou-



taining our tarpaulin-covered sleighs on which machine-guns had been mounted, their brass-plated propellers gleaming in the wintry sunshine. All around glistened the burnished steel bayonets of the guards, who sat and stood about in the trucks in their heavy sheepskin coats, felt boots and fur-caps.

Gathering speed, the train whisked away the tail wagon, the last box-car, from the brake-platform of which the young commander of the sleigh crew looked back at us. He pulled off his fur-cap and waved it. We had a last glimpse of his dark curly hair and smiling face with its rather heavy chin, and then it all dwindled away and melted into the distance.

"Some day, maybe, we'll meet again," he had said.

And so we did. It was one of those remarkable coincidences that often happen in real life. We met again six, I beg your pardon, seven years later under the most unusual circumstances, when I . . . But of that in its proper place.

## 21

Day was breaking outside the window

"The third dawn," Berezhkov said.

Everyone in the room understood what he meant. Berezhkov's engine had been running these last two days and nights without a stop, propelling the Soviet airplane on its great circular flight.

The "interviewer" expected to hear some more about this flight from Berezhkov—he was dying to hear of it. Berezhkov himself was more than once tempted to broach the subject, but he brushed it aside, "switched himself off," as he called it.

"Now where did I leave off?" he said.

"You haven't finished with the Compass."

Ah, yes, Berezhkov continued. The Compass did a good job. I told you already that we saw the first party of sleighs off at Perovo. This force distinguished itself many a time in the fighting. Our troops were driving the routed white army south towards the Black Sea. The

crews of the aerosleighs were put back on their armoured cars, and our machines the whole first batch of them, were shipped to us in Moscow for repairs. Some of them had been damaged by shell-splinters and bullets.

In nineteen twenty we turned out two more batches of thirty each, but the aerosleighs took no part in the fighting that year, as there was no winter campaign. Before winter came the Red Army had smashed through Wrangel's defences at Perekop. And, with his defeat, as you know, the Civil War ended.

Several months later however, a counter-revolutionary mutiny broke out at Kronstadt. A column of our aerosleighs took part in the historic assault of the fortress. In the Central Archives of the Red Army you will find an order of the military command paying tribute to the role the aerosleighs played in the Kronstadt operation. A group of us Compass workers did our bit, too, there, on the ice of the Gulf of Finland. This lameness of mine is a memento of those days, by the way.

## 22

I won't bother you with the details of that trip on the aerosleighs or the assault of Kronstadt. I'll tell you about my last meeting with Zhukovsky.

After his second stroke Zhukovsky lay in a grave condition in a nursing home at Usovo, outside Moscow. Before leaving for Kronstadt I was very anxious to visit my sick teacher and say good-bye to him.

The head physician of the nursing home allowed me to go in and sit with him for fifteen minutes.

The door of the room was slightly ajar. It did not lead directly into Zhukovsky's large bright bedroom, though, but into a small anteroom. I was just about to knock at the door of the anteroom when I saw Ladoshnikov in there.

He was standing near the light, busy rigging up with the aid of screws something out of brand-new slats covered with fresh varnish. He was working almost noiselessly.

ly What could he be doing, I wondered. Surely he wasn't messing about with some model of his here, right next door to his sick teacher? I halted him softly. He looked up, gave me a friendly nod, and motioned me to come in.

"The thing jams, dash it," he murmured. "Take a look at it, will you. What would you advise?"

It was a very cleverly constructed device—a revolving and adjustable book rest for Zhukovsky, to enable him to read comfortably in bed. Something was wrong with the construction, and it didn't open smoothly. Ladoshnikov was engaged in "developing" again.

"I'm sorry, Ladoshnikov, I have no time. Is the Professor sleeping?"

"I think he's sitting up. Just resting. He's done a lot of dictating today."

"Does he work every day?"

"Yes. I take most of it down for him," Ladoshnikov said, adding sadly, "he's in a hurry to finish it."

We were silent.

"I've come to say good-bye. I'm leaving today."

"Where are you going?"

"Kronstadt. Our aerosleighs are wanted there. Drivers too, by the way. We'll probably go into action."

"Who else is going?"

I named the workers of the Compass who were down in the list.

"Why didn't you put me down?"

"Oh, but . . . We can't have you go, Mikhail Mikhailovich."

"Nonsense. How did you come down?"

"In an aerosleigh. I took the commissar of the republic's armoured forces along with me to demonstrate our machine to him. I think he's going to take over command of the squadron."

"Where is he?"

"Somewhere downstairs, I believe. I left him with the doctor."

Ladoshnikov laid aside the screw-driver and went out without saying a word.

I knocked on the door of Zhukovsky's bedroom. A nurse let me in. The moment I stepped across the threshold I was assailed by the smell of apples, the delightful aroma of ripe Antonovkas. Zhukovsky was fond of them. They must have sent him down a boxful. It reminded me all at once of the little house in Milnikov Pereulok, which, in the winter, always had this agreeable cozy smell of Antonovkas about it (they were brought down from the country house in Orekhovo). The white tile stove gave off a pleasant warmth, stirring memories of Zhukovsky's study of the old saddened home. Yes, saddened. Not so long ago twenty-year-old Lenuchka, his only daughter, had died. It had been a stunning blow to the old man. He had a stroke—a haemorrhage of the brain—then another. Zhukovsky fought to keep his grip on life, he went on working, dictating his unfinished researches, but he could not bear to return to the house where his daughter's ringing voice was no longer to be heard.

When I came in, he was sitting at the window in a deep easy-chair mounted on four castors. At the sound of my footsteps he tried to turn his head, but this was difficult for him. I strode up hastily.

"Ah, Alexei! How do you do," he said. "So you've come to see me at last."

I noticed with a pang that he had an impediment in his speech. He smiled gladly, and I saw the dearly loved grey-bearded face become distorted: the paralyzed side was immobile. The eyes alone had not changed and looked bright and undimmed. His knees were covered with a brown check plaid. His large seamed hand, which was paralyzed too, lay yellow and waxlike on the dark cloth.

I felt ashamed of myself for not having visited him for so long. I had last been here together with his other pupils and relatives to celebrate the fiftieth anniversary of his scientific activity. We had read out to him the decree signed by Lenin, in which Zhukovsky was called the father of Russian aviation, and heartily congratulated him. He had been sitting in this very armchair, and had

wanted to get up and say something in reply, but had not been able to. He had started to cry then.

"Good morning, Nikolai Yegorovich!" I said cheerfully. "How are you feeling?"

"Sit down. What's the news with you?"

But I repeated:

"How are you feeling?"

He pointed to the table with his unparalyzed hand. Books and bulky stacks of manuscript lay on it.

"There. I'm dictating a course of mechanics. I'm anxious to finish it. It isn't too tiring. I look out of the window. The rooks are very early this year—see them. They must be nesting already in Orekhovo."

He shut his eyes, then opened them again, bright and sparkling.

"And how are you getting on? How's your engine?"

"I've dropped it, Nikolai Yegorovich."

"That's a pity. It's such a clever thing. You must take it up again. Promise me that you will."

I promised.

"What are you working on now? Have you invented anything new?"

I told him that I was leaving that evening for Petrograd, where a column of aerosleighs was to take part in the assault of Kronstadt.

"And you too?"

"I don't know yet," I said evasively. "I'll be handling repairs first."

Zhukovsky nevertheless guessed what I was going for—I could read it in his eyes. He realized that I had come to say good-bye and was silent and thoughtful. After a while he asked:

"How is it out there? Is the ice still strong?"

"Yes. It must be very slippery, though. Wet. I've been told that the aerosleighs are liable to tip over."

"Of course they are!" Zhukovsky said animatedly. The impediment in his speech was gone for a moment. "Turning on a slippery ice surface will not be the same as it should be under kinematic conditions. D'you understand?"

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"Of course they are!" Zhukovsky said animatedly. The impediment in his speech was gone for a moment. "Turning on a slippery ice surface will not be the same as it should be under kinematic conditions. Do you understand?"

I nodded. But Zhukovsky was not satisfied. He tried to face round towards the manuscripts lying on the table, but could not. A look of pain came into his slightly distorted face. The nurse came up quickly.

"No, not you. Call . . ."

He was plainly fatigued. The mere act of speaking tired him.

"Don't bother Nikolai Yegorovich," I said.

The nurse guessed what he wanted.

"Ladoshnikov?" she asked.

Zhukovsky inclined his head.

He looked very pleased when Ladoshnikov came in.

"Ah, there you are. Get my report, please . . . the one about the Dynamics of the Motor Car. You will find there the theory of skidding on the turn . . . on ice-crusted ground. Take it, Alexei. It'll come in useful."

Exhausted he fell silent again. After a while he said to Ladoshnikov:

"Alasha, do you know where he's going?"

"I'm going, too, Nikolai Yegorovich," said Ladoshnikov.

"Where?"

"To Kronstadt. I've already made arrangements with the commissar."

"What about your plane? Aren't you going to get it ready for testing?"

"I can do that when I come back. I haven't forgotten 'my dear sir' of yours—he is not going to be absent this time!"

"Ah, well, God bless you," Zhukovsky murmured.

His paralyzed yellow hand did not stir, but the other rose in a gesture of farewell, then dropped back heavily. He shut his eyes. The nurse motioned us to leave the room. Ladoshnikov made an awkward jerky bow to his beloved teacher and turned sharply towards the door.

The nurse said:

"Shall I read something to you, Nikolai Yegorovich?"

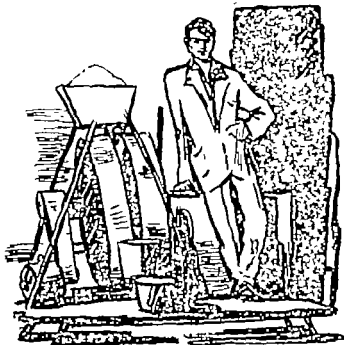
"No, thanks. I'll just sit here a bit and think about how it is out in the country. The little streams will soon start



running under the snow there, I suppose—flowing into the pond. Do you remember that pond of ours, Alexei?"

I remembered how, twenty years ago, I had seen Zhukovsky with a black curly beard, like that of a gypsy, how he had shouted to us kids from the Orekhovo dam, "Hi, children! That's not the way to bathe!" how he had thrown off his baggy duck suit, jumped into the water and swum right across the pond with his hands above his head, snorting and squirting fountains of water from his mouth. And now that big strong body, broken by age, sorrow and paralysis, was sinking fast. I did not answer, I couldn't speak.

We went out on tiptoe. I never saw Zhukovsky again. He passed away quietly several days later, at dawn on the seventeenth of March nineteen hundred and twenty-one, conscious until the last.



WITHOUT COMPASS

## 1

A streak of sunshine fell upon the ceiling of the room in which we had been sitting through the night, listening to Bereshkov's stories. It was about four o'clock in the morning. Bereshkov swallowed a cup of hot black coffee and lay back against the cushions of the ottoman, relaxing with eyes shut. One could see now how tired he was. There was an unwanted nervous flush on his cheeks, and a touch of red on his eyelids, too.

I will not repeat the murmured conversation that went on in the room. After a while the company began to break up. The first to leave was Fyodor Nedolya. He was going to Berezhkov's design office, where the young folks had been sitting up all night, too, waiting for news about the flight. It was time I went, too, I thought, the more so that my hand was stiff and cramped with holding the pencil for so many hours. I gathered up my notebooks, the precious harvest of that night, and started for the door, taking care not to disturb Berezhkov.

I got no further than the door, however. Berezhkov opened his eyes and sat up briskly, wide awake on the instant.

"Hullo, where are you off to?" he cried.

His glance falling on the portrait of Zhukovsky hanging on the opposite wall, a twinkle came into his small greenish eyes and he shouted:

"Hi, children, you can't work at all, I see!"

He got up, stretched, pulled back the sleeves of his shirt and declared:

"Now, then—down to work! I'll have you wide awake in a minute. We now turn over a new chapter in the life of yours truly, a tremendous epopee under the title of 'Free Lance.' No, let's rather call it 'Without Compass.'"

Not waiting for me to get back to the table with paper and pencil, he took up his narrative with verve and gusto you would hardly expect in one who had spent a sleepless night. I realized then, perhaps for the first time, what reserves of vital energy this man had in him, at what high pressure he must have been running things at that design office of his. I forgot the cramp in my hand and sat down hastily to take him down. My pencil was off again.

2

With your permission, Berezhkov began, we shall raise the curtain on an autumn day in the year nineteen hundred and twenty-one.

Imagine a bleak morning, and a chilly room tenanted by yours truly; imagine that gentleman himself extremely

loath to crawl out from under his blanket, and last but not least Maria Niko'yevna—sister Masha—who, before going to work, had to think of her dejected brother, make him his breakfast, have a chat with him, and pour balsam on his tortured soul Masha was then working as staff artist at the Gubsovnarkhoz—which, translated into plain Russian, means Gubernia Council of National Economy—where she drew all kinds of diagrams, wrote slogans, pasted together photomontages and made a name for herself as a decorative artist at exhibitions. There wasn't any decent sized exhibition in Moscow—like those arranged for the Soviet or trade-union congresses, for instance—that she did not have a hand in.

Well then, this kind, devoted, loving Masha goes up to her brother's bed and says

"Get up, Alexei"

"What for?"

That kind of question always had poor Masha bamboozled. What could she do but repeat once more what she had been repeating day in day out for three months running, "You've got to do something!"

Big changes were taking place in the country—a switch-over from War Communism to the New Economic Policy, called NEP for short. It was a real sensation the Bolsheviks had allowed private enterprise! Frankly, I never tried to puzzle out the political implications of NEP, and didn't know the first thing about the great historical issues at stake. All this NEP business, as far as I was concerned, meant just one thing: free trade, private enterprise.

I did not read the newspapers. I hinted darkly to my sister that life wasn't worth living, and I preferred to laze and lie about, as if to prove to myself and the world at large that my working days were over and no one had any more use for me. For one thing, wasn't I getting an invalid's ration? It was good-bye to life, to bubbling, joyous life. Good bye to my old friend the motor-cycle. In my heart of hearts, though, I thought otherwise. When, things going hard with us, Masha had timidly suggested selling my motor-cycle, I had growled something about wanting to keep it for memory's sake.

Masha was sorry for me. She thought that my friends had left me cruelly in the lurch. As a matter of fact Ladoshnikov hadn't been to see me for ages—probably busy trying out his new plane, the LAD-2 Ganshin was engaged in his researches, writing his dissertation. As for Fyodor, he was in love with his factory and had cooled towards me, a man who had abandoned himself to the philosophy of despair. Yes, Berezhkov, you are forgotten! The fact that my friends had not given me up until they had wasted a good deal of their time and eloquence on me, was not taken into account, of course. I had come to a dead end—that was the long and short of it. Only one thing could help me get back my grip on life—some new marvellous idea, some amazing invention that would make everyone sit up. Deep down in my heart I was convinced that that was what would happen, but I wouldn't admit it aloud for anything in the world.

And so I looked at my sister reproachfully and fetched a heart-breaking sigh. Masha sighed back. She had no time to talk, and busied herself tidying up my room, sweeping the floor, and carefully dusting the bear, the kite and other wood carvings made by Stanislav, her husband. It was less than a year since he had been killed in the fighting at Perekop, and here was I shamelessly making her life still more miserable for her.

At last Masha finished what she was doing and turned to me.

"Why don't you go and see Shelest again?"

"What for?"

I had already called on Shelest, our former Compass chief, our shrewd chairman, sportsman, companion of all our runs, professor of internal combustion engines at the Moscow School of Engineering. His latest idea was to set up a research testing station for aircraft engines at the school, and he was now waiting for that project and the estimates to be approved. He told me, "I'll be glad to have you work with us. But these are not Compass times. I'll make you dig into books and theory. You'll study engines on my instructions." I had asked tentatively, "What if I invent something of my own?" Shelest had answered

jovially, "Don't be in a hurry. Let us first study what others have invented before us. And then. Take it from me, Berezhkov, you'll have all the chances you want to show what you can do." Such had been the tone of that conversation. Frankly speaking, the prospect of working with Shelest both appealed to me and frightened me. To work on his instructions? That was not a bad school of experience of course. But wouldn't he dominate me, bear me down by the sheer weight of his own creative personality? Wouldn't I become just a wage-worker, a little nut in his machine? Again and again that pet phrase of mine—"a designer should be free"—came to my mind. But how was one to achieve that?

Masha made another attempt to comfort me and suggested that I should call at the Sovnarkhoz that day.

"Come and see our exhibition. It will give you an idea of what they're doing at the factories these days. Some of them are not producing anything yet, but everywhere there are initiative groups of engineers and workers. You could do the same. You could choose whatever you want. They'll take you on anywhere, a man with your gifts."

"Who wants me now?"

"What d'you mean? They'll take you anywhere, on any job."

"Job?"

I gazed soulfully at the ceiling and pulled the blanket up. No, a job didn't attract me. A job meant being at someone's beck and call. I had once held several simultaneous jobs, dashing about all over Moscow, and afterwards had devoted myself entirely to the Compass and even taken up my lodgings in the workshop for nearly six months, but then I had felt free to do as I liked and follow my own inclinations. I hadn't looked on it as a job, but as an outlet for my unspent energies. Even now, dammit, while I was lolling about in bed, making a great moan and playing on the pity of my loving little sister, I was conscious of having more than enough of those energies and craving to do big things. I felt like leaping

out of bed and      and what? Whither? I didn't know So I started moaning again

"Oh, you don't understand Maybe you think that serving mankind is the same as holding a job in some office or other? No, my dear, an inventor is an artist, a free lance. Can you imagine Repln or Serov going out to work? Do you think they created their canvases behind an office desk?"

Masha didn't know what to say, how to give me the hint that she was already late for the Sovnarkhoz

"What's for breakfast?" I inquired with a dismal air

"Rye porridge."

"What, again!"

Masha brought in from the kitchen a plate of hot boiled rye grains This unmilled rye was part of our food ration.

I took a spoonful of the cooked grains and started chewing them, spitting out the husks It was nasty stuff

"It would be a good thing to have this rye ground, Masha "

"There isn't anywhere to do it," my sister said

"D'you mean to tell me there isn't a flour-mill in all Moscow? You'd be able to bake some fritters or pancakes out of it."

"I'd be only too pleased to give you a treat But there isn't a place where you can get grain milled in Moscow At least they don't serve private customers "

"But what do other people do with the stuff?"

"They boil it, same as we do Finish your breakfast, Alexei, and get up "

She gave me a kiss and went out.

I lay there brooding and glancing every now and then at the cooling porridge.

All of a sudden the bell rang. I heard Masha in the passage opening the street door and speaking to someone. I recognized the gruff voice of Ladoshnikov So he hadn't forgotten me after all

"Oh, don't bother!" came the familiar growly voice. "I won't take my things off."

I leapt out of bed and slipped my trousers on. I glanced at the rumpled bed clothes and hastily tried to put them in order.

Then I hurried out into the passage. The dark hall seemed to be aglow with sunshine. It was Ladoshnikov, standing there with a bunch of golden autumn leaves. I shook hands and tried to draw the visitor into the room, but he hung back, and turned to Masha embarrassedly, holding the bunch of leaves out to her.

"They force these on you everywhere these days," he said apologetically. "You can't get rid of them till you've bought a bunch."

Masha thanked him and took the bouquet.

"I'm sorry, but I have to leave you," she said. "I'm going to work."

"Splendid," Ladoshnikov muttered.

It sounded rather irrelevant, and Masha smiled. But Ladoshnikov repeated doggedly—

"Splendid. And these"—pointing to the leaves—"please paint them, and present the painting to your pupil."

Ladoshnikov had once persuaded Masha to teach him drawing. Every designer, he declared, should be able to draw pictures as well as designs. These lessons had brought them together. When Masha became a widow, Ladoshnikov invented all kinds of subjects for her to draw and paint. He believed there was nothing like engrossing work for taking a person out of himself when he felt bad.

Masha thanked him for the bouquet and took her leave, saying she could not stay another minute.

Ladoshnikov and I went into the room. His eyes were hidden under their bushy brows, and he didn't seem to notice anything about him, but actually—I knew that only too well—he did not miss a thing. Of course, the untidy bed and my unshaven face did not escape him. I wouldn't have been surprised if he had started laughing at me. But he was silent. He didn't look any too cheerful himself.

My visitor sat down at the table just as he had come



in from the street—in a large cloth cap and a leather jacket. He wore that jacket almost at all seasons, and everything about it was familiar to me—the frayed cuffs, the elbows worn almost white, and even the big oil stain near the left lapel. The smells of varnish, glue and ether, which he carried about with him, were familiar too.

"Messing about with acetone?" I said, not without envy.

Acetone, a solvent for celluloid, is an ingredient of aircraft varnishes, and it was not surprising that the work jacket of an aircraft designer should give off that sweetish smell. Ladoshnikov, however, brushed the question aside with a gloomy gesture. Strange. What could be the matter with him, I wondered.

"Can you give me a cup of tea?" he said. "I wanted to go into a tea-shop, seeing there are so many of them these days, but I decided to drop in and see you instead."

I was reminded of that night tavern for cabmen, the clouds of frosty vapour, the blurred electric lights, the vodka in the white teapot, and Ladoshnikov's outspread hand held up in a gesture of warning against the subject of his airplane.

"Why aren't you at work today, Mikhail?"

"Day off," he answered vaguely.

I did not press the point. If he wanted to, he would tell me himself. I went out into the kitchen, put the kettle on the oil-stove and returned to Ladoshnikov.

He was pacing up and down the room, munching an apple. He offered me one.

"I'm going away today," he said at length.

"Where to?"

"Petrograd. New job."

"What do you mean? And what about the LAD-2?"

"That's all over and done with. Not accepted for production manufacturing."

"Not accepted? But the tests showed—"

"Tests have nothing to do with it! The committee decided that the days of wooden airplanes were over, and there was no sense in putting a plywood construction on the armament list. The Red Army needs metal aircraft."

Well In a word, I agreed with the decision. They were right."

He renewed his pacing from wall to wall I looked at his boots, big, strong coarse-lanned high-boots. He set his foot down firmly and squarely A man like that was not to be easily bent or broken. He stopped, looked at me and said

"When it turned out that the LAD-2 was no longer wanted, I asked to be given the opportunity of constructing a big airplane. Something like the LAD 1 I was refused. It wasn't the time for it, they said We didn't have big enough engines"

"What about the Adros? Isn't that worth working on?"

"Who's going to work on it when Berezhkov is loafing about?"

"H'm. D'you think the committee will revise its opinion if I stop loafing?"

"I doubt it."

"So do I And what are they sending you to Petrograd for?"

"I'm going to the Aero Works Ever heard of it? They've appointed me head designer there The place has been stripped clean, and we shall have to put it on its legs again. Until we're ready for building aircraft we shall have to manufacture all kinds of small articles out of kolchug-aluminium to start with."

"Out of what?"

"Kolchug-aluminium. Don't you know it? It's a light alloy It's now being turned out by the Kolchug Works Anyway, it'll give us a chance to study the material."

"What are you going to make? Saucepans? Primus stoves?" I sneered.

The shot went home.

"What's wrong with saucepans!" Ladoshnikov said challengingly "We're not above handling saucepans so long as we can revive the plant. After that we'll make things hum."

I noticed with surprise that Ladoshnikov was already enthusiastic over his new job Or, to be more exact, he was torn between conflicting emotions that day while he

grieved over his creation, the LAD-2, his thoughts were already running forward to his new job, and he found himself loving the ruined little works in Petrograd to which he was now going.

"On the whole," Ladoshnikov went on with restored good humour, "we'll try to run things on a self-paying basis. And we'll prepare the ground for manufacturing metal aircraft. If the design is good and the tests give favourable results—then all we shall need are funds and the word to go ahead! See what prospects there are, Alexei! It's a pity, though."

"Meaning your LAD-2?"

"No, that will not have been wasted. I've been thinking of a tubular construction out of metal, you know. The pity is we shall have to make a small machine again. One adapted for a hundred horse-power engine. I'm afraid we'll have to buy the engines from the Germans. I believe they're also going to try and build a hundred horse-power Gnome-Ron engine at the Dvigatel Works." He looked out of the window, then turned to me, and added, "That's not quite the thing, of course. I'd like to build big machines, Alexei. You understand?"

I nodded. I should think I did understand! A big air plane with a powerful engine—why, it had been my dream! Ladoshnikov shot me another glance from under his bushy brows and suddenly burst out laughing.

"But if you go on loafing," he said, "it'll be some time before I get an engine for a big machine."

At that moment a brilliant idea—at least, so it struck me—flashed across my mind. I jumped up and cried:

"Look here! Let's send them all to hell! Let's build your big metallic airplane ourselves!"

"What d'you mean ourselves?"

"What I say. As free constructors. We'll set up a design office with workshops of our own. Didn't you say a designer should be free!"

"Free from Podralsky, you silly ass!"

"Oh, no. Entirely free."

"Wait a minute. Where is your design office going to get its funds from?"

Well In a word, I agreed with the decision. They were right."

He renewed his pacing from wall to wall. I looked at his boots, big, strong coarse-tanned high-boots. He set his foot down firmly and squarely. A man like that was not to be easily bent or broken. He stopped, looked at me and said

"When it turned out that the LAD-2 was no longer wanted, I asked to be given the opportunity of constructing a big airplane. Something like the LAD-1. I was refused. It wasn't the time for it, they said. We didn't have big enough engines."

"What about the Adros? Isn't that worth working on?"

"Who's going to work on it when Berezhkov is loafing about?"

"H'm. D'you think the committee will revise its opinion if I stop loafing?"

"I doubt it."

"So do I. And what are they sending you to Petrograd for?"

"I'm going to the Aero Works. Ever heard of it? They've appointed me head designer there. The place has been stripped clean, and we shall have to put it on its legs again. Until we're ready for building aircraft we shall have to manufacture all kinds of small articles out of kolchug-aluminium to start with."

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"Oh, no. Entirely free."

"Wait a minute. Where is your design office going to get its funds from?"

"It'll pay its way. You're going to start with saucepans at that Aero Works of yours, aren't you? Well, you and I will go one better than saucepans. We'll invent something that'll bring the money pouring in right away."

"You're on the wrong track, Alexei."

"I'm not. We'll set up an Idea Depot of our own with an experimental plant."

"And become capitalists—is that it?"

"Not capitalists, but free engineers. Free lances! And we'll dare to do what you'll never be allowed to do as a salaried employee!"

"No thanks, old chap. I'm going to Petrograd."

"And I'll prove it to you. Give me two or three years and you'll see what a free designer can do."

"What I see is that you're talking tommyrot. These ideas are pretty much the same as those of the Kronstadt fellows, who demanded 'free capitalism.' We spoke to them with weapons." Then, in a milder tone, he added, "You don't know yourself what you want."

"Do you?"

Ladoshnikov, unexpectedly, burst out laughing again.

"I do. I want to eat—I'm as hungry as a wolf."

Acting the hospitable host, I went into the kitchen and brought him some rye porridge.

#### 4

Here (Berezhkov, with a sly smile, raised his forefinger) we begin a new chapter in our true story. A suitable epigraph to this chapter would be, "The fatal moment was drawing nigh Pushkin."

In offering Ladoshnikov breakfast, I felt in duty bound to apologize for the simple meal.

"Sorry, it's the best I can do. We got this for our rations—Masha and I've got a sackful of the stuff left over from Compass days, too. It's my staple article of diet. How do you find it—is it edible? Does it need more cooking?"



"It'll do"

Ladoshnikov settled himself uncomplainingly to the repast, chewing hard on the boiled rye grains and spitting out the husks

"Why don't you grind the stuff?" he said

"There isn't a flour-mill in Moscow where you and I can have our grain milled. They don't serve private customers."

"You're a fine inventor, you are! Why don't you make a grinder instead of sighing and moaning?"

I all but jumped up, as though I had suddenly received an electric shock. A brilliant idea had struck me. Here it was—the first of those brain-waves that were to bring fabulous profits rolling in, and provide me—the free inventor—with the necessary working capital for my future free experimental workshop.

I stared at the porridge, fascinated. Why, rations were still being issued at the factories and offices, thousands of people were still getting this unmilled rye, eating porridge of boiled grains and spitting out the husks because there was nowhere to mill it. Ergo, the thing was to rig up a mill! The authorities would not object. Why, the state would benefit by it, too!

Well, well, my dear Ladoshnikov, we'll see what you have to say about your friend, the free designer, in a year or two!

I hardly remember seeing off my visitor—I was so excited. When he had gone, I dressed myself quickly and dashed out of the house, bent on finding premises for a mill.

5

The trees were shedding their leaves, and the autumn sun lacked warmth. Where to go? Why think? Let's just go facing the sun. Elated, I strode down the boulevards of the Sadovaya Ring, humming a tune. My ears were tingling, and the pavement underfoot felt springy.

Near Samotyoka I noticed a single-storeyed detached little house with an attic, painted yellow. It stood in an

open place on the corner of a quiet little street, and bore obvious signs of being untenanted and abandoned. All that remained of its fence—pulled down apparently for firewood—were the stumps of the posts, the window-panes, some of them cracked, were thick with dust, and on the street door hung a huge rusty padlock.

I tapped the padlock and peeped in at the window. The floor, as often happens in untenanted houses, was littered with scraps of paper. I had a glimpse of odd-looking objects—some machines (oho, just the thing!), things that looked like baths or troughs, and a battered old sofa near the door.

I immediately sought out the house management.  
"Whose place is it?"

The house manager, who, to judge from his baggy clothes, had once been quite a stoutish man, looked me over, and was apparently impressed. He stood up, cleared his throat and readily came forth with the information that before the Revolution the house had been used as a galvanizing and nickel-plating workshop, whose owners had gone away, no one knew where. The place now belonged to the Motoring Department of the Moscow Soviet. That meek house manager never guessed how near he was to being hugged at that moment. In those days I had already learnt my lesson in self-control and could calmly carry on a conversation without betraying the fire that raged within.

What an amazing stroke of good luck! I had always been welcomed at the Motoring Department as one of its founders, and a worthy member of the motoring brotherhood.

I rushed off to the Motoring Department, hunted out its president, a good friend of mine, and said:

"I want the key to the house on Samotyoka."

"What key? What house? What are you talking about?"

"The house that belongs to you. It has a padlock on it."

"So what?"

"I want to see whether the place will suit me for testing out one of my inventions."

"What have you invented?"

"I'll explain that afterwards. Let me see the place first."

"By all means I have no need for it just now."

"Send someone with me. We'll open it up and make an inventory."

Back I went to the boulevard with one of the clerks of the Motoring Department, and knocked the rusty padlock off with a single blow of a crow-bar. A zinc- and nickel-plating workshop, abandoned in full working order, was presented to our gaze.

In the basement we found several baths in which the plating used to be done. One of the rooms contained odd pieces of furniture, including a crippled armchair, a battered chest-of-drawers and a rickety old sofa.

The inventory was drawn up in a quarter of an hour. I took over the house according to that inventory, and promised to call again at the Motoring Department within the next few days to make arrangements for the lease of the premises.

6

I was all afire with eagerness. Masha had no peace either. That first-class decorator and exhibition artist was kept busy all the evening with duster and broom, but not even she, for all her sweeping, washing, and scrubbing, could cope with the accumulated dust of years that had settled in that house.

Meanwhile, I tackled the electricity, checked the wires, cleaned the contacts, and then, not a bit tired, rushed off home and brought down a mass of useful odds and ends, including several electric lamps, with which I lit up the house.

By this time Masha had raked up a huge heap of rubbish.

"Alexei, all this has to be taken out. Throw it in the dust-bin."

"What, throw this out? You're crazy! It's a treasure!"

I carefully sorted out the whole heap. These leaky buckets, now, would come in useful, this old boot was leather—d'you realize that, Masha?—leather for all kinds of washers and things, and these rotted sleeves—oho, you've no idea what use we can make of them, tin scrap—we'll need that too, broken sofa springs—we'll find a use for them, waste paper—well, I daresay we can spare that, but not for the dustbin, though—we can use it for lighting the stove, getting this damp out of the air. A bit of firewood has been left over, too—we're in luck!

The rubbish having been sorted out, I next tackled the stove. I examined the flue, raked out the ashes, lighted some paper in the ash-pit (with Masha grumbling at the smoke, of course), and at last, to my immense delight, got the stove to draw.

Wonderful premises!

"Masha, darling, if you think this mill is my limit you're jolly well mistaken! This is only the beginning. The take-off."

"The take-off for bigger things?" my sister chipped in.

I detected a faint note of irony. Except for an occasional sigh while helping me, Masha hadn't said a word all day—she didn't want to mar my buoyant mood.

Plainly, the stunning idea of rigging up a flour-mill didn't rouse her enthusiasm. But then hadn't she been urging me herself all the time to take up something that would keep me from brooding and lolling about!

Catch me lolling about! From now on I was going to sleep on that sofa there with the ends of the springs sticking out of it, I was going to be up at the peep of dawn to toil and mull over my invention.

"What, you intend to sleep here?"

Casting timidity aside, Masha began to rail against the dreadfully damp place, where, in a single night, one was liable to be stricken with tuberculosis, or at the very least, rheumatism. But I just pooh poohed her fears away. I ran home again and came back with my pillow, sheets and blanket.

Good night, Mashal I kissed my indignant sister, bundled her out, locked the door, made my bed on the sofa, turned off the light and lay down. I immediately became sunk in thought, figuring out how best to fix up my flour-mill

Let me tell you that I didn't know the first thing about flour-mills. Only once in my life had I been to a water-mill and seen the millpond, the wooden wheel and the huge millstones. I had no literature whatever describing the working of a flour-mill

But I recollected that, among the things I had brought with me in moving over, was a fat general reference book for engineers

I jumped up, switched on the light again, got out the reference book and found "Flour-Mill" under the letter "F." I read it through carefully. Then I turned up the letter "M" and found "Millstones," from which I learned that millstones were made in the following way: you take a stone (one of the hard kind), crush it small, screen it, then put it into a mould and fill it up with muriatic acid, which acts as a binder. The entire information about millstones was given in a single column of small type. I returned to my couch and put on my thinking cap

A hard kind of stone. Eureka! Throwing my coat over my shoulders I went out into the street in my slippers and under cover of darkness pried loose a few cobble-stones in the roadway

I returned with my booty, and spent the whole night crushing the cobbles with a hammer. Several times I hit my fingers, but then I had the satisfaction in the morning of seeing rubble scattered all over the place, and a sieve with a tin sheet under it filled to the top with crushed stone.

All I needed now was muriatic acid. But where was I to get it? As you know, I was stone broke, and had hurled myself into this remarkable venture of free-lance activity without a penny to my name. Where could I get some acid on credit? I needed quite a lot, too.

Casting about in my mind, I thought of Podralsky. Why, of course, he should have all the murlatic acid I wanted. He was the very man to let me have some.

What? Didn't I tell you how Podralsky managed to swim with the stream under the new order of things? Oh, then I'll have to make good that omission right away.

7

Well then, this is what happened to Podralsky.

By your leave, though, I had better describe a certain scene dating to the spring of nineteen nineteen. Imagine a sunny day in April or March.

I was sitting in the freezing cold building in Ordinka—it hadn't been heated all through the winter—where the Committee of Inventions was housed. I held a post there (one of my side-lines, of course) as chairman of the technical council and it was my business to receive inventors.

I remember a lean clean-shaven man coming in, wearing a Finka—a round leather cap with a fur band, which was very popular those days—and a black, worn-out pony-skin jacket. He carried a huge pair of gauntlet gloves under his arm.

I was struck by the queer smell—something between that of smoke and tar—my visitor carried about with him.

"Sit down," I said courteously. "What can I do for you?"

And suddenly I heard an amazingly familiar voice.

"Don't you recognize me, Alexei Nikolayevich?"

Good heavens! I almost fell off my chair with astonishment. Before me stood Podralsky, our old Pussycat. But where was that black little moustache of his, that winning smile, those plump pink cheeks? I hadn't met him since nineteen seventeen, since the day the soldiers who were building the amphibian had trundled him out in a wheelbarrow. What had he been doing with himself all those years? What transformations had he undergone? And what on earth could have brought him here?

He held his hand out—a strange, callous, yellow hand, which looked as if it had been stained with henna. I offered him a chair again.

"Sit down, Anatoly Vikentyevich. Have you come to see me on business?"

But Podralsky did not take the proffered seat. By force of old habit he looked round, then said, dropping his voice.

"Yes. I have a tremendous invention."

"Have you? What is it?"

"Could you come down with me into the street, Alexei Nikolayevich? I'll show it to you—the actual Thing."

A minute later we left the building. At the curb stood a ramshackle old Flat car. Podralsky opened the side door and invited me in with a sweeping gesture that was reminiscent of his punctilious old manner.

"Where are we going?" I asked.

"To see the invention," Podralsky answered mysteriously.

He slipped in behind the wheel and drove off. We rode along in silence for several minutes, listening to the wheels swishing over the darkened melting snow and splashing through rivulets and puddles.

"Don't you notice anything?" Podralsky said.

"I can't say I do."

He smiled and said:

"Would you care to drive yourself?"

"I don't mind."

We changed places. I took the wheel, stepped on the gas, then slowed down, and accelerated again. The car creaked, as any old lady of its age was bound to do, but nevertheless made quite a creditable showing.

"Well?" Podralsky inquired. "Don't you notice anything?"

"No. Unless it's . . ."

"Unless what, Alexei Nikolayevich?"

"It smells funny . . ."

He must have been waiting for me to say that, for he gave a pleased laugh and asked:

"D'you know what it smells of?"

"What?"

"This is a new era in motoring. From now on Soviet motor transport will not suffer from any shortage of fuel."

"Oho! That's saying something!"

"It is," said Podralsky. "Stop the car, will you?"

I did so. Podralsky got out, unscrewed the carburettor nut and poured off into the palm of his hand a little yellowish fluid, which he held up to my nose. It was turpentine. So that was what accounted for the smell of tar. I don't know whether the idea of using turpentine for petrol was Podralsky's, or whether he had come by the "invention" in some other way, but the fact remained that his proposal created a sensation.

In view of the desperate shortage of petrol the "invention" was immediately accepted, although, as it soon transpired, the turpentine caused ring stickiness and gave drivers a lot of trouble.

A small plant was placed at Podralsky's disposal outside Moscow where he organized the extraction of turpentine.

Podralsky was sure to have a carboy of muriatic acid available. He would never refuse to lend me some of it. Hurry up then!

8

What is twenty kilometres? In the old days I would have answered, "Twenty minutes by motor-bike!"

But when I dropped in at my flat to snatch a hasty breakfast and looked at my motor-bike standing in the passage I just sighed. What if I tried it after all? I'd take it out and see. But what's the use—I'd tried it once before. My left foot didn't reach the rest.

Twenty kilometres was no easy trip for me now. I'd have to go by tram. That would only take me as far as the suburbs. But never mind, from there I could travel by stages. Ever heard of that mode of travel? You look over your shoulders, see a cart going your way, and ask the



driver sweetly to give you a lift. He glares at you and whips up his horse, so does the second driver, but if you're lucky the third will give you a lift. Not exactly enjoyable, but then what won't a man do when he sees a big shining carboy looming tantalizingly in front of him with a crystal-clear marvellous liquid in it by aid of which he will be able to transform an ordinary cobblestone into a lovely millstone.

But what if Podralsky refused me credit? What if he wasn't at the turpentine plant any more? I felt like lashing up the old nag to get there quicker.

I found Podralsky installed in the managerial diggings at the tinest of factories. The windows of the house were graced with simple linen curtains in place of the rich crimson hangings that had adorned the old home.

He answered the door himself.

"Ah, Berezhkov! What has brought you here? Business? Splendid. I love business people."

He ushered me into the dining-room. The things in it were all brand-new, shining with varnish—apparently made at the factory's own joiner's shop.

"Yes, it's all new," Podralsky said, intercepting the glance I cast round the room. "I've taken nothing from the old life with me. That's done with. Starting a clean slate."

He brought his bright black little eyes to rest on a fan-pattern of portraits hanging on the wall. Side by side with Karl Marx were portraits of famous representatives of the communist women's movement—Clara Zetkin, Rosa Luxemburg, and, if I am not mistaken, Kollontai.

"I've come on urgent business," I repeated.

"Plenty of time for business. Loyal! Let me introduce my wife to you, Alexei Nikolayevich."

I did not show my surprise, of course, when, instead of Yelizaveta Pavlovna—that dignified lady whose name had been immortalized by the mysterious "Ilizit" compound—I found myself introduced to a fairly young person.

"Handshaking is abolished!" she cried jokingly, repeating a then popular slogan. I made a bow. Podralsky's spouse tossed her bobbed fluffy hair back from her forehead. She had a bold, breezy look about her. Sun-tanned, wearing a short skirt of coarse army cloth, and neat little high-boots. Quite a modern type!

But at the moment I was least of all interested in the hostess.

"Anatoly Vikentyevich," I said, "all I need is a carboy—"

"I don't know about carboys, but we always have a bottle in the house."

His wife took the cue and immediately made for the sideboard. Vodka, pork fat, bread and pickled little cucumbers made their appearance on the table.

"Excuse the fare—proletarian snacks," quoth the modern young woman.

The host put some pickled mushrooms on my plate. His hands, which had been yellow and horny when I last saw him, were now soft and pink again.

A frying-pan with the most marvellously browned potatoes came sailing out of the kitchen. We chatted about this and that. Lolya hadn't been to Moscow for some days, and was now voicing her displeasure. How was it I didn't know how many new shops had been opened in Petrovka? Was it true that a new confectioner's shop had been opened in Stoleshnikov Street?

I was on tenterhooks. Would Podralsky give me what I so badly needed? Pussycat hadn't answered my question as to whether he had any muriatic acid. Another question that was worrying me was whether I would be offered more fried potatoes or not. I was ravenous.

You couldn't blame me. What can you expect of a man who hadn't had a crumb in his mouth since the morning, and then it was just a few spoonfuls of that beastly porridge!

Podralsky acted the amiable host.

"Let me fill your glass again, Alexei Nikolayevich! Here's to you, to your energy, your future."

His wife threw in meaningly:

"Yes, energy's the thing. Life these days favours the go-aheads."

After having fortified myself, I was feeling a resurgence of energy too.

"Anatoly Vikentyevich," I began. "I've hit on a stunning idea, and I need your help."

"With pleasure, with pleasure," Podralsky purred.

I recognized with surprise the old intonation of the Pussycat. He looked at me with a kindly eye and endorsed his wife's sentiment.

"Lolya is right. This government has opened the way again for men of action."

"Yes, of course," I acquiesced. "I could do with a carboy of muriatic acid, you know."

"At your service. And no extra charge, either. You can have it at cost price, so to speak."

How the devil was I to tell him that I had come for the stuff without a penny in my pocket? I mumbled:

"But, er. . . You see. . . Could you let me have it on credit for a week or so? I'll pay you as soon as I get the mill going."

"Mill?"

"Yes, a tremendous idea," I hastened to explain. "Absolutely original."

Pussycat leaned over eagerly and began asking me questions about the mill.

"I see," he said at last. "Let's go!"

"Go where?"

"Straight to your workshop. You'll have the carboy delivered to your doorstep. I'll run you down myself in the car."

"Anything but the car!"

The protest came from Lolya. She sniffed the air expressively with her large nostrils, and I was reminded of the smell of turpentine which Podralsky's dilapidated old car was steeped in.

"You'll take the horse and cart," she said. "I'll tell them to have our cavalry ready in a minute."

Podralsky's sudden eagerness to oblige frightened me somewhat, but the offer was none the less welcome. Imagine me dragging home that precious burden!

Presently Podralsky and I got into the factory's tarantass, the precious carboy at our feet. My benefactor jerked his thumb at the coachman's broad back, put his finger to his lips and whispered

"Sh. Not a word!"

9

Podralsky helped me to drag the carboy into the house.

"I'll drop in and see you when I'm in Moscow"

"I'll be delighted."

He hung about, then wished me good luck and disappeared.

"Good luck, good luck," I hummed, and immediately set about making a primitive griddle out of a sheet of tin, then I placed the sieve in it filled with crushed stone, and poured acid over it. Then, in the highest of spirits, I went off to see Masha. She started feeding me the same old porridge—and that after the treat I had had at Podralsky's!

No more boiled grain for me, damn it!

I persuaded my poor sister to sell all the remaining rye on the market, the proceeds to be used for what I called capital investments. We'll manage somehow, Masha, but in a few days from now. . . Oh, in a few days the mill will repay its creator a hundredfold. He'll be wallowing in money. This brotherkin of yours will enjoy independence and freedom of creative work. And he'll tackle real big inventions—automobile motors, aircraft engines! And maybe—let me do a bit of dreaming, Masha—maybe he'll have an experimental engine plant of his own. How do you like that—the experimental plant of a free inventor?

Masha shook her head and attempted to remonstrate. But I had no time to go into arguments. The future mill

was calling me. I went there humming a tune and spent another night on the premises.

The next morning, burning with impatience, I tumbled out of bed and rushed up to the sieve. Hurrah! The contents of the sieve had solidified. I touched it with my hand, and my fingers sank into a jellylike substance. I gave a yell of pain—the acid burnt my skin.

The damned thing hadn't set! But never mind, it would later. The next morning the stony gruel had set. The result was a lovely little millstone.

## 10

I had the millstones, now the problem was to rig them up. To make them revolve.

Let me tell you that in all flour-mills throughout the world the millstones lie flat, and rotate around a vertical axis, the grain being ground between the stone surfaces. Now the machines at my disposal—those that I got with the house—had only horizontal axes.

In a flash of inspiration an invention was born. For the first time in world history I rigged the millstones vertically, like grindstones. It was a simple thing, of course, to fix two round stones on a horizontal axis, but any specialist will tell you that you can't grind anything on such millstones. But the wonderful thing about creative thought is that it drives you to do the impossible.

I invented a way of grooving the millstone on the principle of the Archimedean spiral. I painstakingly hewed out the intricate pattern of the spiral in the stone, imagining myself the grain that drops into the groove, feeling myself, with a thrill of real pleasure, being caught, crushed and ground by the millstones, and coming out in a delightful trickle of flour. I'd have to do a lot more inventing before I got that mill of mine going, though. But I did it all as quick as lightning, so chock-full of ideas was I.

Take the belt, now. What was I to use for a belt-drive? A real belt was not to be dreamt of in those days. The

number of factory belts that had gone to make boot-soles during the hard times of Civil War and the subsequent economic chaos was appalling. It was a real dilemma.

While wrestling with this problem I called to mind the chief of the Moscow fire brigade, an old acquaintance of mine from motoring-section days, with whom I had once spent an enjoyable day on a hundred-kilometre run, demonstrating the splendid performance of a car, once an ordinary lorry, which I had refitted into a fire engine.

You'll probably ask—what's the fire-brigade chief got to do with a belt-drive? My answer is—the fire hose! I came away from the fire-brigade chief the richer by two pieces of old hose. I joined them together and coated them with tar, and became the proud owner of an excellent belt.

11

The next thing was a motor.

All I needed now to start the mill was an electric motor.

I knew that the Compass workshops had once had two or three stand-by motors of small capacity—the very thing I needed.

Its mission fulfilled with glory, the Compass and all that belonged to it had passed into the hands of a winding-up committee. I rush thither. Shouts of welcome greeted me.

"Alexei Nikolayevich, how are you getting on?"

"Friends, sell me an electric motor."

"What for?"

"That's a secret for the time being. A great invention."

I was told, however, that the winding-up committee, unfortunately, had no right to dispose of anything.

"Then let me have one temporarily. I'll sign an undertaking to return it to you in perfect condition the moment you need it."

This, in the competent opinion of the chief accountant, was an acceptable arrangement. We drew up an agree-

ment under which I received the temporary loan of one electric motor for the purpose of testing my invention.

With that paper in my possession, I was about to shake hands heartily all round and run off for the motor, when it transpired that one more formality had to be complied with, namely, the signature of Professor Shelest was required. The former chairman of the Compass was now chairman of its winding-up committee—an honorary sinecure.

I promptly went off with that precious paper to see Shelest at the School of Engineering.

Memories assailed me from all sides the moment I saw that familiar building, the moment I set foot in the courtyard.

There it stood, the three-storeyed unplastered brick building, known as the "red house." There, with the aid of seven or eight undergraduates, Nikolai Zhukovsky had once organized his aerodynamic laboratory, housed in a single room. I had been one of those seven or eight, working away there with plane, chisel and glue together with Arkhangel'sky, Ladoshnikov, Tupolev, Mikulin, and Vetchinkin. One of them might be in the laboratory at that very moment. Should I drop in there?

No, they'd start asking all kinds of questions. Poke fun at the "free lance." Or, worse still, pity me. No, I'd go and see them later, when I was sure that I wouldn't look ridiculous or pitiful.

And over there was the tool-shed where our engine, the Adros, used to stand. Ganshin and I had designed and built it five years ago—the most powerful petrol engine in the world. I had promised Zhukovsky just before his death that I would take it up again. And so I would! As soon as I had everything all set.

Loath as I was to go into the "red house" I was obliged to do so because Shelest was in there. I strode through the yard, pushed the door open, and, without looking round, shutting out all memories, I ran upstairs to where I had been directed.

Shelest was standing in the middle of a large room, in which several students and workmen were busy with

saw, plane and hammer, rigging up what looked like a platform. He spun round, and I felt, as usual, the vital force that emanated from his clear grey eyes. No wonder that at fifty he still drove a motor-cycle and aerosleigh, that professor with the distinguished iron-grey hair, the teacher of all Russian engine experts.

"Ah, Berezhkov!" he exclaimed joyfully "Here you are, at last! We're rigging a new ship here, as you see. I'm as good as my word. The crew is a small one, but I'm keeping one berth open for you."

He proceeded to explain that the School Council had assigned funds and premises—to begin with this single room—for organizing a scientific research station for motor-car and aircraft engines.

"We shall test and study foreign makes at first, and then"—Shelest leaned over to me and added in an alluring whisper—"and then we'll construct our own aircraft engines. What do you say to that? Eh?" He drew back and looked at me. Then bending forward again, he continued, "First I'll make you sit down to your textbooks like a student. You must have forgotten a good deal these last few years. We'll brush up a bit, put in some good work and then turn our station into an Institute, create a Russian school of aircraft engine construction. Meanwhile we'll start from scratch with the help of several eager hands and hotheads. This will just suit you, I know."

Yes, it suited me well. It always did give me the keenest pleasure to find myself in the thick of some new venture, among the men who were starting it. Again I was reminded how, a floor lower down, in the same building, we had rigged up a similar laboratory for Zhukovsky. Ought I not perhaps give up everything else and stay here with Shelest? Ought I not take this chance, accept his offer, go back to the path on which I had launched at fifteen as a wildly enthusiastic inventor? Go back to that early passion of my youth, unforgettable as a man's first great love—the designing of engines? But no, only one engine interested me at that moment. Would I get it? Whatever you may say, I just couldn't stop myself.



"I'd like to see anyone stopping you!" Ganshin suddenly threw in.

The rest of the company laughed heartily. Apparently it was an old joke. But Berezhkov waved it aside with an expressive gesture. He did not want anything to divert him just now from his narrative.

12

Could I stop? he went on. Could I quench the flame that was burning me up? No, I could not give up that little shop now, give up those millstones with my Archimedean spiral to have saved my own life. I had got caught in that spiral myself, I was pulled into it body and breeches. All that was needed was just one more step, one more word, one more signature, and

And tomorrow I'd hear the first rustle of rubbing millstones, tomorrow that wonderful mill of mine would come to life. I'd come back to the engines yet. Life had lots of wonderful things in store for me, anyway.

Inwardly quivering with impatience, I kept up a polite show of lively interest.

"Yes, yes. That's wonderful! Terrific! But just now I'm engrossed in one little invention. Will you please do me a favour?"

"What is it?"

"Oh, just a trifle. All the formalities have been completed, and only your signature is required. I need an electric motor for a few days."

Saying which, I held the paper out to him with a resolute air.

"For a few days?"

"Yes."

I said it without turning a hair, so confident was I that in several days I could afford to buy a dozen electric motors if need be.

"What do you want it for?"

"Sign this first, and then I'll tell you."

"All right. I'm always glad to help you in any way I can with your inventions."

He got out his fountain pen and signed the paper. I promptly thrust it away deep in my pocket.

"Well, what do you want it for?" Shelest repeated.

"Between ourselves, I'm opening a flour-mill."

"A what?"

"An ordinary flour mill. One that grinds grain. It'll be the one and only mill in Moscow that'll serve private customers."

"What's that you said? Serve customers?"

"Yes, private customers—the public. For instance, you have some rye grain at home, I daresay, which you got on your ration coupon."

"Well, suppose I have?"

"Why, you just bring your rye down to my mill, and—hey, presto!—I turn it into flour for you. That's all. A clever trick as old as Methuselah."

"Do you mean this seriously, Berezhkov?"

"Absolutely."

"I can't make you out. What do you want this flour-mill for?"

"To get rich. I want to be a free designer and inventor."

"Let me have that paper back."

"Oh, no."

He stood looking hard at me for several seconds in utter silence. I sustained the glance coolly.

"Ah, well. You're old enough to know what you're doing," he said at length. "I can only regret the fact that I was one of your teachers. Do as you please. But bear this in mind—I will never forgive you this!"

The Professor's words drifted past my ears. I was worked up to a pitch of excitement when nothing mattered.

"You wait, Professor, you'll see what I'll achieve. To tell you the truth, it's my daring ambition to be able some day to offer you a post as chief consultant to my firm."

"The milling firm?"

"No, that's just the beginning. It's nothing to what I'll achieve in time!"

"Go away!" Shelest said angrily "Go away, and don't you dare come to me complaining that life has been treating you shabbily—it's what you deserve"

He turned his back on me, and I went out.

13

The money left over from the sale of the rye and earmarked for capital investments went to pay for transporting the motor to my business premises. I mounted it myself, working as electrician and fitter.

Then, at long last, came the unforgettable moment when I pulled the switch down. A blue spark flew out. That meant it had made contact. Amid a profound silence the hum of the motor gained steadily in volume. Then I engaged the transmission strap. The millstone gently came into motion and started to sling. There it was—that first thrilling murmur of stone and metal springing into life, that first stirring of a construction conceived in the human brain. The other millstone was set firmly on a wooden axle. I began carefully to bring the two stones together, reducing the gap between them. There came a harsh grating sound, and a shower of sparks as the stones touched. The next moment I separated them.

The millstones revolved splendidly, and the sound of them was like music to my ears. The novelty of the invention consisted in my having placed the millstones in a vertical position and used the Archimedean spiral in making the grooves. The question now was—would my millstones grind, was the principle correct?

Grain, grain, a kingdom for some grain!

I hadn't as much as a pinch of it left. I had sold the whole sack. And so it happened that I found myself without any grain at the very moment when I needed it for testing, a moment when a constructor is prepared to pawn his very soul for the sake of getting his thing tried out.

It was evening already. Too late to go anywhere and hunt out some grain. Ah, well, I'd open the mill just as it was. Open it tomorrow first thing in the morning, and

test it out with the grain of the first customer who came along. And so that difficulty was lightly brushed aside.

It was decided then—tomorrow morning I open shop, tomorrow morning I start milling! A raised platform still had to be knocked together on which I would strut about like your true-born miller, keeping an eye on the proceedings. A signboard had to be made, too. I'd have to order one from Masha right away. This very minute! And home I dashed.

This was when I appreciated my sister's gifts. A sheet of old iron was fished out from somewhere—it might have come off the roof for all I know—and Masha dutifully laid out her whole stock of oil paints on the table and fell to work.

"Lay it on thick, Masha, I'll buy you a gross of paint boxes soon."

Masha just chuckled. The things that that future rich brother of hers had promised her those days!

"Lay it on thick!" I repeated. "Make it striking and arresting. Something that'll give people a jolt."

After composing the text for the signboard, I went out into the yard, found some old planks in the shed, shouldered them, and staggered back to my business premises through the dark deserted streets to give the place the finishing touches and knock up the platform. I worked all night at this carpentry job, and by daybreak—which comes late in the autumn—the shop fixtures were all ready.

I ran home for the signboard in a mad hurry.

I found a masterpiece. The inscription, in beautiful gold lettering on a dark-blue background, ran "First Moscow Mechanical Flour-Mill, Constructed by Engineer Berezhkov."

The moment I looked at it, however, I felt that it didn't hit the eye, somehow, that people were likely to pass it by with a bare glance. Struck with inspiration, I painted in at the bottom in large letters, despite my sister's protests, "Private Customers Served."

Then, after snatching a hasty breakfast, I demanded that Masha should help me put the sign up before she

went to work. We crawled along at an agonizingly slow pace, since the paint on the signboard was still wet and we had to be very careful in handling it.

Right in front of the house stood a thick post—all that remained of the fence that had once been there. I had long had my eye on it as an ideal place for the signboard. But I had no ladder, and it was quite a time before we got that signboard nailed up. At last the job was done.

I ran to the other side of the street. The magic words "Private Customers Served" were plainly visible from there too.

And so the mill was open!

I let my sister go to that job of hers and was left by myself in the flour-mill. I clambered up on the platform and stood waiting for customers.

14

I stood there for a long time, fretting with impatience. But no customers came.

I ran out several times and stared expectantly up and down the street to see whether anyone was tottering along with a bag of grain on his back.

But people just passed by. I felt like stopping somebody—the first person who came along!—shaking him by the shoulders and pointing to the signboard with a shout, "See that? Run home at once and lug your grain down!" I tried hypnotizing some people, but it didn't work.

Not for a minute losing faith in my great idea, consoling myself with all kinds of thoughts, I'd go back to my shop, step up on the platform again and lean, waiting, on the rail. No one knocked, no one came in.

Many a thought and rosy dream thronged my mind during those hours of waiting. I thought of the fortune I was going to make, of the great inventions I was going to give the world.

I thought also of Professor Sholest, to be sure. He had turned away from me, but there'd come a day—as true as

I live there would!—when he'd take his hat off to my talent and my success.

All those thoughts and dreams, however, were but faint glimmerings that came and went, crowded out by other emotions that are familiar to every designer. No dreams of wealth, of fame or love can compare in intensity with the tremendous excitement that grips me whenever I conceive something new, and especially when I am waiting for the thing to be tested.

And this thing, strictly speaking, had not been tested yet. The most thrilling, the most devilishly exciting and interesting thing for me at that moment—far more interesting than all the good things the mill could ever bring me—was the question. Is the conception of the design correct? Will my flour-mill work?

It was getting dark outside. Disappointed and tired out, I was about to close the mill, when suddenly there came a timid tap on the door.

I yelled with all my might, "Come in!"

The door was not locked—it had been left open for customers—but no one entered. Could it have been my imagination, I wondered? Was I beginning to have hallucinations?

I sprang down from the platform at a tigerish bound, and rushed to open the door. There, on the threshold, stood the house manager, the one who had received me so deferentially when I had come to inquire about the little house. I can see that half-scared wondering sort of look on his face with its apologetic smile as if it were yesterday.

He stood there, bent under the weight of a big sack. You understand—a sack!

"Excuse me, Comrade Berezhkov," he began, "I've only just come from the office and didn't see your sign-board till now. So we are going to have a flour-mill in our yard now?"

"Yes."

"And one can have one's rye milled?"

"Certainly. As much as you want."

"Private customers too?"

"Of course. Didn't you see the sign 'Private Customers Served?'"

"Is it all legal and proper?" my first customer went on probing

"Why, of course. It's NEP."

My statement did not lack assurance, although I had no trading license yet.

"When I came home," the house manager said, lowering his sack, "and saw your sign, I thought—that's fine, I'll have my rye milled now. I have a lot of unmilled rye."

Without wasting further words, I grabbed the sack and swung it on the scales, as if I had been doing that kind of work all my life. The acquisition of those scales, by the way, is a story in itself—but then the whole thing is like a tale out of the *Arabian Nights*.

After weighing the sack, I heaved it up on to the platform, jumped up there myself and started pouring the grain into the cone. My customer watched the proceedings with curiosity. My own curiosity was just as keen, to say the least. Would it work?

I pressed the switch home. A blue spark shot out. The motor started humming and the millstone came into motion. I opened the grain slide and began bringing the millstones together. All of a sudden they set up a screech and a howl. A gruel-like stuff the colour of earth mixed with sparks began to drop into the box placed below to receive the flour. And the smell! It was like burnt galoshes.

The startled face of the house manager put the wind up me too, but I didn't show it. Cool as anything, I quickly drew the millstones apart. But now the grain was dropping into the box whole. Ever so carefully, I started bringing the millstones together, but the moment they touched they started screeching again. Once more we were treated to a whiff of burnt galoshes.

I went hot and cold all over. What the . . . The darned mill didn't work!

The next instant it occurred to me that I wasn't handling the thing firmly enough. The millstones had to be brought closer together so that the flour could form a film between them. I boldly increased the feed. The screeching

ceased, the sparks stopped flying, and flour began to pour into the box. Whew! At last

True, the flour was poorly milled and crunched on the teeth, but still, it was flour

I wrung from my first customer his full measure of admiration at this cunning device of mine, then between us we twisted a huge paper bag out of a couple of newspapers and he generously poured off several pounds of flour—my dues as miller

A minute later I turned the key in the lock of my door, came away from it, pressing the bag with the flour to my bosom, and performed a dance step on the porch.

Suddenly, a pretty voice came out of the dark

"Make way for the flour king!"

What the devil! There, by the post on which my sign-board was nailed, stood Podralsky's phaeton. Lolya, declining the help of her fond husband, jumped lightly to the pavement and came tripping towards me.

"Hullo! We happened to be in your neighbourhood. I've been doing some shopping, you know"

She began to dust my jacket with a strong sunburnt hand. Would you believe it, I was covered with flour from head to foot! "Flour king" was right.

"I knew you'd be a success!" Lolya said, eyeing me approvingly, then added what was apparently her favourite maxim, "Life belongs to the go-ahead."

Podralsky's pink face beamed geniality

"My congratulations, Berezhkov!" he cried.

I shuffled about uneasily. Would I have to invite them in? Masha was waiting for me at home. We had planned a royal feast of *oladyas*\* And now—here you are—this unexpected meeting! Was there no way of escape? But Pussy-cat was tact itself

"Don't bother," he said, taking his leave with a bow. "We just happened to be passing. We'll drop in some other time."

"Please do! I'll be glad to see you!"

"So you're making a go of it, eh?"

\* *Oladya*—a kind of thick pancake.—Tr



"Rather!" Seeing that the visitors were going I repeated delightedly, "Like a house on fire. Talk about good luck!"

I saw them get into the carriage, waved my hand to them, pressed the precious bag to my bosom again and ran off home.

15

It was a smiling Masha who was kneading the paste. She loved to entertain guests.

But who were we to invite? Ganshin was ruled out—he was hard at work on one of his researches. Our only hope was Fyodor. I'll eat my hat if I don't drag him down for *oladyas* today. I don't remember whether I told you or not—Fyodor Nedolya was working as a fitter at the Krasny Metallist Works. The thing was to get to his hostel quickly. But how? By tramcar? The prospect was anything but pleasing, especially now, during the rush hour. And much too slow anyway. No, that mode of travel was primitive and old-fashioned. But what was the alternative?

Without being aware of it, I found myself standing by my motor-cycle, which still occupied its old place in the passage. Should I try it? After all, my lame foot was no handicap when it came to running about the streets, dashing backwards and forwards. But try as I might, my left foot did not reach the foot-rest, it had no support. But wait a minute! What if I raised the foot-rest? Or fixed a bar there, say? Why the devil hadn't I thought of it before? It was so simple!

My hands were busy already with spanner, screwdriver and hammer. The foot-rest was raised. Now let's sit down and try it. Splendid! Both feet stood firmly planted. Petrol splashed in the tank. The thing now was to take the machine out into the yard, start up the engine, and . . . and come what may!

And so we find your obedient servant, the elated inventor, shooting out of the gate on his motor-cycle. He'd have liked to glance up at Masha's face in the window—it

probably looked at once joyful and anxious—but he did not dare to tear his eyes off the road.

I gradually put on speed. The wind whistled in my ears. My, it was grand! Remember Gogol—"What Russian does not love swift travel!"

I raced through the centre. Passed the Kremlin, over which the red flag had been flying for nearly four years now. Prechistenka, Sadovaya, Krimsky Bridge, Kaluzhskaya Square. Then the outskirts. The long blank wall of the Krasny Metallist Works stretched along the street. Everywhere signs of neglect—broken or dirty skylight panes, birds' nests under the eaves. Only a few of the works' numerous chimneys were smoking. At last a shop—the only one working, its windows clean and gleaming.

Oho, a new signboard too! Over the main gates, in big letters "R S F S R Krasny Metallist State Works." Next to it red bunting with an appeal to revive heavy industry—the basis of socialism.

But where was the hostel? Fyodor had said, "A two-storied house almost directly opposite the factory gate." This must be it. Stop!

A minute later I beat up Fyodor's quarters. It was a simple room. Some of the cots had grey army blankets on them, others patchwork country quilts.

Several young workers were sitting round a table, listening to a newspaper article, which someone was reading out to them. I caught sight of Fyodor and waved my hand to him. The reading broke off. Eyes were turned on me questioningly.

"Good evening, Alexei Nikolayevich," Nedolya said, adding for general information "This is Comrade Bereshkov. The one who was my commander at Kronstadt."

The words acted as a smile opener. I was invited to sit down. But I drew Fyodor out into the corridor.

"Get dressed, Fyodor, and come along with me!"

"Where to?"

"Down to my place to eat *oladyas*!"

"*Oladyas*? What do you mean?"

"What I say *Oladyas* out of my own flour."

"Naturally, not the next man's flour "

"You don't understand! I milled it myself At my own flour-mill "

"Your own?"

"Yes, Fyodor, my own I've opened a flour-mill today "

"Alexei Nikolayevich, I don't seem to get this straight "

"Yes you do! I can call a thing my own if I've invented it, can't I?"

"Well, yes "

"It's a beauty, Fyodor You'll like it!"

Tracing patterns on the wall with my finger, I told him the story of the unique, vertically set millstones made out of ordinary cobbles. At last Fyodor saw it He voiced his delight.

"Wonderfull And does it work all right?"

"What am I inviting you to *oladyas* for? They're made out of my first flour By the way, Fyodor, I've come down on my motor-cycle—the first time since all those months I've got it outside."

"Really?"

"Come along! You'll ride pillion We'll do the talking at home That mill, old chap, is just byplay, an idle fancy The groundwork, so to speak. If you only knew what a workshop I'm dreaming of! An Idea Depot, let's call it."

"Wonderfull But hadn't you better come to work at our factory? We need men like you just now, need them ever so badly "

"No, Fyodor, you won't catch me taking on a staff job You needn't stare. Everyone has his own scheme of life. I've got to be my own master A free inventor Ever heard of a free lance? It's one who values freedom above all. You come and work with me, Fyodor Join the Idea Depot. We'll build a stunning motor car of our own invention."

Fyodor dropped his eyes and shook his head

"What? Don't you want to? Come along, we'll thresh it out over the *oladyas* "

"I don't want *oladyas*."

"What are you sulking for?"

"I don't like *oladyas*," he repeated doggedly.

He did not argue—he was much too shy and taciturn to lecture me. He stood there shifting his weight from one foot to another but when I attempted to look into the room again, he barred my way in a very determined manner. He did not want his room mates to see his former commander in this new light.

So I came away alone and went home.

10

Next day three or four women came to the mill with sacks of grain. I weighed the bags, milled the grain and issued the flour with a business-like air. I charged four pounds of flour per pood. That day I made about twenty pounds. I went home to sleep, and assured Alasha, as I polished off her *oladyas*, that the day was not far off when friends would gather round our table and everyone would be amazed at my success and would congratulate me.

Going to the mill the next morning—it was its third morning—I saw, while still a good way off, an astounding spectacle. There was a tremendous queue outside my shop and a milling crowd round the door. The hubbub was terrific. Mounted militia held the crowd back and tried to keep order. (At this point a leg in a brown trouser shot up from the sofa like a signal, and Ganshin queried ironically, "Mounted militia?" "Oh, all right, have it foot militia," Berezhkov conceded.) Waving the shop key over my head I squeezed my way through the crowd, yelling at the top of my voice that I was the miller.

Representatives of the militia went inside with me. I was asked to present my documents and papers certifying my title to the mill. What could I show? The militia drew up a charge-sheet, in which I was accused of engaging in unlicensed business activities and of disturbing the peace.

When this formality was completed, I asked

"And now what?"

"Now we're going to seal up the premises. The seal will be removed after you have paid the fine and taken out the proper documents."

"What does the fine amount to?"

A sum much more than I could ever hope to scrape together was named. Now, if they'd let me do some milling, I'd be able to pay them out of the proceeds. But no, the militia wouldn't hear of it. Pay the fine first, Citizen Berezhkov, and then we'll talk.

At that moment the door flew open, and in walked Podralsky, *just in the nick of time*. It baffles me to this day how that grandmaster of black magic had managed to time his appearance so well, how he had contrived to squeeze through the crowd that besieged the premises and pass the militia cordon that let nobody in. Somewhat dishevelled after the crush, with two or three buttons missing off his overcoat, but none the less plink, bland and imposing, he reminded me of the old Podralsky, the owner of the hush-hush laboratory. I wouldn't have been surprised if he had started growing that natty moustache of his again.

"What's going on here?" quoth Pussycat, smacking his lips with relish.

I all but flung myself on my saviour's neck, and pointed to the obnoxious charge sheet. Podralsky evinced no surprise.

"Well, we'll have to pay that fine," he said off-handedly, and inquired with cool insouciance what it amounted to. Then, without further ado, he pulled out a wad of treasury notes, counted off the required amount, and placed it on the table. I was so astonished that I could barely stammer out

"Anatoly Vikentyevich, I'll repay this debt in the next few days."

He did not let me finish the sentence.

"Nonsense. Don't mention it."

After that he presented to the authorities various identity papers certifying among other things that he was

the legal patentee of several outstanding inventions and that a factory outside Moscow had been placed at his disposal.

With an air of grave dignity he offered the representatives of the law a letter of guarantee that I would take out all the necessary papers within a week. Without giving them time to collect their wits, he said, nudging me, "Show the comrades your invention, Berezhkov."

I rose manfully to the occasion, demonstrated my invention, showed how it worked, explained how the idea had originated, and how I had tested the thing. I made it sound entertaining. Podralsky took upon himself to go down at once to the proper authorities and obtain the necessary permits. I signed various statements, obligations and letters of attorney, dashed off a drawing which was to be patented, and handed them all over to Podralsky.

My benefactor's last act was a stroke of genius. At his suggestion we got busy, under the approving eye of the law, cutting out a mass of tickets and numbering them. Pussycat stamped each ticket with his private rubber stamp ("Designer & Inventor"), and even produced a certificate giving him the right to use it.

Meanwhile, Lolya, too, had managed somehow to insinuate herself into the shop, moved by a noble impulse to come to my rescue. She took things in hand and started putting the queue in order by distributing the line tickets. That morning, by the way, we issued tickets for several days ahead.

The militia let things go at that for the time being, and left the premises. Podralsky went off to legalize the business. His wife, shouting cheerily, stood on the doorstep handing out the tickets, while I did a roaring trade, milling away for dear life, covered from head to foot with flour, and even having my lunch right there on the platform so as not to hold things up. That day's receipts amounted to nearly ten poods of flour—almost a fortune those days.

I knew Podraisky inside out—at least, I thought I did

I could see him coming along tomorrow, say, or the day after, with my documents, purring, pink, and roguish "Anatoly Vikentyevich," I'd say, "I'm ever so much obliged to you. How can I ever repay you?" And he'd answer, "Take me into the business"

Pussycat, of course, had it all chalked out. He knew that I couldn't refuse him after what he had done for me. As a matter of fact he had saved my mill. I wondered what he was counting on, what share of the business. About twenty-five per cent, I daresay, if not thirty.

But I wasn't going to haggle, not me. By all means, Anatoly Vikentyevich, let's make it fifty-fifty! But have the goodness, please, to take charge of the business and run the mill yourself. My job is to invent and create! I could imagine how my partner would get things humming. It would be Tono-Bungay back again with a bang! I could see a new building springing up, equipped with new mechanical devices. An elevator would deliver the grain to the top floor. The flour would pour into bags, which would be automatically weighed and tied.

Your obedient servant would design and construct all this with pleasure. Podraisky would handle the commercial side. I'd get fifty per cent of the profits. That was a damned lot of money! A good basis for future operations and creative quests as a designer.

If only Pussycat didn't lose interest in the business and change his mind!

Apparently there was little likelihood of that happening. He took care to let me hear from him regularly. The next morning I ran into Lolya at the mill door, where she was as busy as ever, keeping order in the queue. That energetic young person told me that her husband had been running about all day yesterday seeing to the affairs of the mill and would be at it today. Next she passed on to me his advice that I should immediately rig up and start a second set of millstones going. Pod-

raisky would probably send down two first-class factory-made millstones, which he had stumbled on somewhere or other. He had gone for them already.

In fact a cart presently arrived with a small set of millstones as well as boards, plywood and other materials, accompanied by a dour-looking hulking chap. A work bench was promptly knocked together, and the dour-looking chap started to fix up the second set of millstones under my directions, while I went on with the milling.

Lolya was acting the ministering angel to me. This "free lance" credo of mine tickled her to death. She kept on repeating that the business had to look good. It wouldn't do for us inventors, God forbid, to be confused with private tradesmen, with the Nepmen. Our business had to be properly legalized, and this, she gave me to understand, was no easy job. However, the obliging Pus-syat, who popped up from time to time, definitely promised to see the thing through.

I went on with the milling for several more days, and was then relieved at the machine by a master-miller, who had been specially employed. The mill continued to yield me a profit of ten poods of flour per day. The place was chock-full of flour, so I started charging money instead. That was when I came bursting in on Masha in the evening—I hadn't been home for two or three days—waving a whopping fat wad and yelling, "A fortune! A gold mine!"

That idea, that mill of mine, had really turned out to be a rich vein. I payed off all my debts—the muriatic acid, the lease of the house, and all the other things I had obtained on credit. I returned the electric motor to the Compass within a week, as I had promised, after having bought two others elsewhere for cash.

As for Podraisky, he'd drop in for a minute or two, and then I wouldn't see him for days at a stretch.

One day Lolya said,

"Anatoly is coming down tomorrow morning. He has completed all the legal formalities about the mill. He'll tell you about it himself."



Then came that morning—the twelfth morning of my mill. I came up to the house and stopped dead in my tracks. A new signboard adorned the post: "Flour-mill 'Progress,' Inventor Podraisky."

What? Had the man swindled me? Robbed me of the mill? Yes, that's exactly what he did. Pussycat had simply swallowed me, gulped me down whole. It appears that all the title deeds and documents were made out in his own name—including the patent on the invention, the leasehold, and all the rest.

He presented the papers to me himself, or rather copies of them certified by a notary. I wanted to hit him over the head with something heavy, but the dour-faced chap he had recently hired stood there looking as if he meant business.

Let me describe that picturesque scene to you.

18

Tall, lean and extraordinarily active, Berezhkov had kept jumping up in the course of his narrative to act the parts in the scenes he was describing, laughing heartily one minute and putting on a tragic air the next.

Outside, through the open window, the sun was already shining. Moscow was astir, and the trams were running.

Suddenly the telephone rang. Berezhkov broke off, his face paling, and snatched up the receiver. We sat listening to his exclamations.

"What's that? In a fog? What? How about the crew?"

Obviously something very important had occurred, but from Berezhkov's tone one could not gather whether the news was good or alarming. At last he shouted out:

"Yes, all right. I'm coming at once!"

He put the receiver down. I noticed for the first time since our acquaintance that his hands were shaking.

"They've set her down," he threw out jerkily.

We expected details, but Berezhkov hurriedly changed into his shoes without uttering a word. Questions were fired at him.

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towering brickwork with the rectangular voids of its window openings

"Now I can paint that flour-mill of yours in whatever colours I like," I said jokingly "I can put in towers, and suspension ways, and other things in your style"

Berezhkov was now taking a greater interest in the book that I was writing from his stories.

"Oh, no," he said "I'll cross it all out for you We must stick to the truth"

"But, Alexei Nikolayevich," I couldn't help exclaiming, "I'm sure that you let your imagination run away with you, too, sometimes"

Berezhkov turned round He was wearing an autumn coat of heavy brown cloth, a cap of the same material, and a smart quiet tie tied with easy careless skill My exclamation had made him smile The cast of his features and especially the set of his lips, however, made him look as if he was always smiling Although he was over forty, life had not even started to pull down the corners of his large freshly coloured lips If anything, they had a slightly upward tendency that created the natural pattern of an engaging smile.

"If you don't believe me, I won't tell you any more," he said.

I had to coax and wheedle before he finally came round

"In those days," he said, "one would often come across huge covered vans with the inscription 'Podralsky Flour' here in the Sadovaya Perhaps you remember them? If you looked closer, you might have been able to make out a few words in smaller letters, reading something like this 'Flour made at the mill constructed by Inventor Podralsky' What d'you think of that? That's called grabbing and 'looking good' at the same time, the way Lolya taught."

"Didn't you fight them?"

"Over the mill? No He offered me a peaceful settlement—ten per cent for the idea I shouted, 'Keep the damn mill! May it choke you! I'll invent a hundred more gadgets like it!' And I turned and went out. But I came

"They've made a landing," he repeated. "I believe everything's all right. The crew is safe and sound. The engine worked smoothly till the last."

"What about the record?" someone exclaimed.

He nodded excitedly. We gathered that the record had been beaten. At that moment of emotional stress Berezhkov was obviously anxious to withdraw into himself and escape our questioning, yet he mastered himself sufficiently to smile at us all before running out and wave his hand from the door.

Presently we heard the chugging of his motor-cycle in the yard. The next minute the sound of the exhaust came from under the windows facing the street.

I caught a last glimpse of him through the window as he shot down the street, his body and close-cropped head (he had forgotten his cap at home) bent low over the handle bars. He jolted over the cobble-stone road, which was deserted at that hour, and the wind belled his thin light-blue shirt.

19

One sunny autumn day, some time after the "night of stories," Berezhkov and I were driving round Moscow in a car. The trip had been arranged at my request. I wanted to see the places he had told me of—Zhukovsky's little house in Milnitskov Pereulok, the Moscow School of Engineering, which Berezhkov had attended, Podralsky's hush-hush laboratory, the workshops of the Compass, and Berezhkov's flour-mill.

Of the latter not a trace remained, however. On the corner of Samotyoka, where Berezhkov had once nailed his signboard, a tall brick building was now going up. The old houses had been pulled down. The street perspective showed other big buildings in the course of construction. Building masts and cranes—those emblems of the five-year plans—stood etched against the clear sky.

Berezhkov stopped the car and showed me the spot where his mill had stood. For a while we surveyed the

tween sheer walls of buildings into the hazy vistas of Moscow's cityscape. Few places in Moscow in the thirties were so roomy for cars as Sadovaya Ring was. Smolensky Market had long since passed out of existence, it was difficult to imagine that there had been a jostling rag-fair here under the open sky. Everything had since been pulled down to clear a way for the stream of motor traffic, had given place to a single broad belt of asphalt divided down the middle by a white line, on each side of which six to seven cars could move along in a row.

"Without that tin of paint there'll be no novel," Berezhkov announced in such a tone that one would think he had written at least a dozen of them. "A good thing I remembered it. This is just where it happened. I came out through that little street over there."

After giving me all the bearings, he followed it up with the story.

## 20

One day, shortly after Podralsky had pocketed the mill, Berezhkov happened to be passing Smolensky Market. The prospects of our free-lance inventor were as obscure as could be.

He wandered aimlessly into the rag-fair, and loitered about there, asking the price of this and that without a thought of buying anything, as he had only three rubles in his pocket, or rather what was the equivalent of three rubles at the time. (No stable currency had yet been introduced, and money was counted in millions—or "lemons," as they were then called). Suddenly he saw someone offering for sale a tin of light-brown enamel paint.

"That doesn't describe it, though," Berezhkov said. "It was a rich mellow brown, not the banal tone of café au lait. You know the slightly browned skin that forms on scalded milk. Well, the colour was something like that, something very warm and rich. Fyodor and I, while lying

to Masha in despair, 'Tragedy! Disaster! They've swindled me out of my mill!'

"How did the affair end?"

"The end was terrific. One day at breakfast—it was somewhere around the year nineteen twenty-two or twenty-three—I was looking through the morning newspaper as usual and nearly fell off my chair. It carried a notice in big type announcing that two state steam mills had been opened. I read with breathless interest that any citizen, from now on, could have his grain milled at these flour mills at the cost of one ruble per pood. Podralsky, like other private millers, had been charging five rubles. Now, at one fell stroke, he had been wiped out of existence, crushed like an insect. That advertisement spelled ruin, swift and utter ruin to all private millers. I forgot my own troubles—you will hear of them in due course—and gloated over the news, as you may well imagine."

"And what about Podralsky? Was he crushed for good?"

"Not he! He popped up again a few years later. And in the most unlikely spot you can imagine!"

"Where was that?"

"You'll know in good time. Let's keep to chronological order."

Bereshkov was about to add something, but his thoughts went off at a tangent. He glanced down the street through which we were driving and his face suddenly crinkled with amusement. He chuckled to himself. Suddenly he asked:

"Have you got anything about the tin in your book?"

"What tin?" I said, surprised.

"Why, the tin of enamel paint."

"First time I hear of it. You never mentioned a word about it."

Bereshkov rapped out to himself, "Stop!"

We stopped at Smolensky Market in the middle of Sadovaya Ring. All these names, by the way, are anachronisms now. A broad circular thoroughfare has been cut through the stony maze of the city, running out be-

In the course of our further conversations Berezhkov told me that every time he got some new idea he would describe it fervidly to his sister, then lead her up to the book-shelf, where the tin of enamel paint stood inviolate, and ask her slyly

"Well, what do you have to say about this tin now? Haven't you a feeling in your bones that scalded milk will be put to use soon?"

And he'd draw his hand through the air with a rhythmic caressing paint-brush movement as if he were keeping time to music.

One of those ideas was a switch. Just an ordinary electric snap-switch. If you turned up the Patent Office records for the year 1923 you would no doubt find an application filed away there for an invention indexed as "Berezhkov's Electric Switch."

I give the story in his own words.

It started like this, he began. Coming home one evening, I began groping for the switch. What the devil! No light! The switch didn't work. I had mended the darned thing twice lately, and now something had gone wrong again.

Imagine a man coming home after what was perhaps a decisive conversation, mentally repeating to himself that women never love failures—coming home to a room filled with the memories of now ruined dreams, and Anyway, I was upset—never mind the reason why (my love affairs, as we agreed, are not to come into your book) The fact was I was fed up with mending that miserable old switch. I tore it down and chucked it away, and went off to bed.

The next morning I got up in quite a different mood. During our student days Ganshin used to wake me up with the words, "Get up, great deeds await you." He swore that Count de Saint-Simon, the famous Utopian, had his servant wake him with those words every morning. I uttered the phrase the moment I woke up that morning, and decided to go out for a prowl about

In hospital in Leningrad—that's to say about a year before—had hit on the idea of a motor car of the most unorthodox type—one without a carburettor and without a gear-box, and I mentally saw it painted just this loveliest of rich brown colours."

Berezhkov sat talking to me over the driver's seat, leaning his chest comfortably against the upholstered back. Cars passed us in an endless stream, most of them Soviet makes—lorries and passenger cars, ZISes and black gleaming "Emochkas," as we fondly called the M-1 sedans. The noises of the city invaded our little house on wheels—the swish of rubber tyres, motor horns of every kind, the throbbing of engines, music from the street loudspeakers, locomotive whistles from the railway station nearby, but upon Berezhkov, true son of this modern world, this noise had no effect. On the centre line of traffic, amid all the hum and movement, protected only by the thin metal covering of the car, he felt perfectly at home.

The story ran as follows. Berezhkov asked the seller "How much for that tin?"

The seller named his price. It was just the sum Berezhkov had—not a kopek more or less. He paid the man right away and took his purchase.

He came home to his sister with the tin of paint.

"What's that?" she said. "Something for dinner?"

"No, it's a tin of enamel paint. A gorgeous colour Browned skin on scalded milk."

She was puzzled. There was no money in the house for ordinary milk, skin or no skin. Berezhkov, however, solemnly announced

"I'm going to paint my new car with it. My name isn't Berezhkov, Alasha, if we don't have a car of our own soon."

This item of news was received with a sceptical little smile, which goaded Berezhkov into a still more solemn declaration

"It will be the finest car in Moscow. People will stop to look at it. Meanwhile—meanwhile let the tin stand on the book-shelf",



No, that has not been planned so far. We hope to get the metal soon."

I thanked him and went away without having discussed my plans.

22

I stepped out into the street in a state of great excitement. My idea was simplicity itself—the switch was to be made of glass. I would mention here that my ideas always take the form of a definite design, a mental image of the thing. At the very moment the idea had struck me in the shop, I saw the thing materialized—its elegant form characteristic of that type of material, its colour—I pictured it blue, for some reason—all its inner arrangements, an attractive and convenient button. Above all I envisaged the press of my own original construction for punching these switches.

I walked along as if stepping out to some light music, in love already with my new invention—the "Berezhkov Switch." It sounds comic, of course—Berezhkov Switch—but my imagination always worked at full blast no matter what I was inventing—a motor, a flour-mill or just a snap-switch.

At the same time thoughts of my future kept crowding in upon me. Yes, my business in life was to invent and go on inventing.

Ah, when would I establish that designing firm of mine, my own drawing office, my business house? Over the door I'd put up a neat little sign "Berezhkov Inventions Office." In a spirit of sheer boyish mischief I was strongly tempted to add another line to the signboard: "We invent everything on earth." Imagine the sensation! But the best thing would be an elegant panel with the single word "Berezhkov" on it under glass. And every passer-by would know that behind that modest sign, behind that door, was the famous office of great inventions.

Moscow to try my luck and buy a switch while I was at it.

Quite a lot of excellent state-run shops had been opened in Moscow. Ladies' and gents' suits, coats, shoes of different styles, silk lamp-shades, ties, gloves and furs were displayed in the windows. All kinds of beautiful fabrics fell in a cascade of folds—the textile industry was reviving. But nowhere did I find any switches.

Leisurely—I had enough time on my hands—I made my way to the electrical supplies store in Alyasnit'skaya, now Kirov Street. Every Muscovite knows the place.

And would you believe it—they had no switches there either. I demanded the manager. A nice little old man came out.

"Can you please tell me why there isn't a single switch to be bought anywhere in Moscow?"

"Our factories are not making them for the time being owing to a shortage of metal."

"What metal?"

"For the covers. They were made of brass or tin. Now those materials aren't to be had."

"When do you expect to have them?"

"I couldn't tell you. Not for a long time, I'm afraid."

"H'm. What about making switches from some other material?" I said.

The manager smiled.

"They'd have to be invented."

"Invented?" I queried.

Right there and then—believe me or not—I hatched the idea of a new switch complete in every detail.

The head office of the Electric Trust was in the same building, one flight up. I went upstairs at once, and sought out the chief of the manufacturing department. I told him I had been all over Moscow and couldn't find a snap-switch anywhere. I learned from him what I had learned in the shop downstairs—that the factories were short of metal at the moment.

"Maybe," I inquired, "you are preparing the manufacture of switches of some other design? From some other material?"

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There were all kinds of ideas, any amount of them, Berezhkov went on. They came thick and fast I can't describe them all, but there's one—that affair about the repairing of the gas generators—that ought not to be skipped over in our book. The plot opens with my being offered to undertake engine repairs at the Woollen Cloth Mill. During the years of economic debacle this mill had been standing idle, or, as they then called it, was "frozen." In the present case, this expression was to be taken literally.

It was winter. To bring the mill back to life the first thing to be done was to revive the power plant, that is, start the two gas generators housed in the basement. I remember going to inspect this basement together with the newly appointed chief engineer. Coal and firewood were already being carted up. The workers, evidently old mill hands, who had stuck to the place through all the years of hardship and disorganization, were building up a long stack of firewood. Some of them tacked on to us.

The massive door hanging on huge, rusty, forged hinges was snowed under. Yielding to the efforts of several pairs of hands, it swung back, scraping away a thick layer of snow. In place of the steps leading down, I saw only ice, a solid mass of ice. It appears that the basement was flooded, like a mine, and the water had frozen right through. This ice, I remember, struck me as a symbol of dead and frozen industry, which was then beginning to revive.

The gas generators lay buried in this mass of ice. One of the old workers turned to me, asking:

"Shall we ever get these motors going?"

"Of course we shall!" I said confidently, although I had seen nothing so far beyond the ice. Mentally, I added as I used to do in my youth, "If I can't do it, nobody will."

To get to the machines and repair them—if they were repairable—all that ice would have to be chopped up and cleared away.

As a matter of fact the passers-by were already eyeing me curiously. That was rather odd, considering that I hadn't become famous yet. Why, man alive, I was walking along gesticulating and talking to myself! I always do act that crazy way when I'm excited over anything.

And excited I was. It was too early to think of the inventions office yet. I'd need a sound basis for that—capital, a reputation, and what not. In a word, I'd need luck!

A sudden thought brought me up sharply. There were no end of inventors knocking about Moscow. Could it be that no one before me had ever seen that precious find, had never reached a hand out to pick it up? What if a new switch had already been patented at the Committee of Inventions? For all I knew, several patents may have been taken out.

To the committee at once! I must stake my claim before anyone else got in ahead of me! I jumped into a passing tramcar like one of Jack London's gold-rush heroes who jumps into a dog-sleigh and dashes off like mad to get there first.

It would make too long a story to describe all the vicissitudes of my invention. Briefly then, no one had forestalled me at the patent office. I made my punch at the workshops of the School of Engineering, then spent several months at a glass works near Moscow, where I was housed, fed, petted and made a general fuss of as the bringer of future glory to the glassware trade. After numerous experiments we got lovely switch covers in delightful hues—ruby, topaz and amethyst. But plastics (or carbolite, as it was then called) beat us. The government committee which was handling the question of switch manufacture gave preference to the plastics factory, which had presented samples too.

As you see, I had no luck. My glass switches did not reach the shelves of the shops. The tin of enamel paint stood in my room untouched.

accounts would be promptly settled if I agreed to accept in payment building materials which were in great demand on the market.

Market? No sir, no markets for me! What d'you take me for—a tradesman, a profiteer? I was a free lance of engineering. I was an inventor. A jack of all trades.

And then the management offers me another tremendous contract—the complete electrification of all the mill's buildings. It was a job after my heart. Electrical engineering was a passion of mine.

I took the contract, but before getting down to it I set my wits and imagination to work, with the result that I demonstrated what was a miracle of its kind—my gang got through with the job in an amazingly short time. Although the committee appointed to accept the work tried hard to find faults, it was obliged to admit that we had done a first-rate job. The committee's criticism concerned only a few unimportant points, which my gang soon put right. We made a perfect clean-up till we had everything spick and span. Then followed days of idleness, days of waiting for money.

According to the contract I was going to be rolling in riches. A tidy sum was still due to me also for the repairs of the gas generators. All in all I was to receive about twenty-five thousand rubles—these in the new chervontsi currency which was on a par with the gold ruble.

Out of this sum I had to pay off the repair gang and pay taxes. I figured that this would eat up about half of what I would get, and the rest would be my net profit. The mill management had already written out a cheque for the whole of the amount. I had seen it in the counting-house with my own eyes. There remained only one or two bookkeeping formalities to be completed. It was only a question of a few more days. My eyes were drawn ever more often to the tin of enamel paint standing on the shelf.

I contracted for all this work, and quickly formed a gang of five men, at the head of which I fell to work with crow-bar and shovel. We hacked away at that ice for days and days. At last we came down to one of the generators. It was in an awful state—all rusty, the steel jacket had burst, the brick lining had crumbled away, and the copper parts had all been stripped off. We gave it a thorough overhauling and cleaning, took the whole thing to pieces, scraped everything with wire brushes, washed it with kerosene, riveted the jacket and lined it with fire bricks. Missing parts were made to our order on the outside from my drawings. We fitted them in, and then, at last, came the hour when our generator, wrested from the clutches of the ice, made its first pop amid loud cheers. The huge flywheel started, and the whole heavy machine came into motion, pounding away and quivering. It was a gala day at the mill. It had now received the power for driving its machines. Bricklayers, carpenters and roofers were at work in all the buildings, machines were being repaired and cleaned. Everything sprang to life as if by magic. The mill's veteran weavers didn't shun the dirtiest work so long as it would help get the mill started quicker. Putting the gas generators back to work was an inexpressibly dirty and tiresome job, but we threw ourselves into it—my gang and I—with such enthusiasm that it became a labour of love. Success at my favourite job of handling engines, the first thrilling sounds of engaging gears, the joy of the mill workers—all this tended to put me in the best of good humours.

There was a fly in the ointment, though. It was no easy job to get money out of the mill office. True, while the work was going on, the counting house would occasionally cough something up when I kicked up a row, but I gave all the money away to my gang to keep things humming.

I was to remember a conversation that took place in the office one hot summer day. I had come, as usual, demanding payment, and was given to understand that



years and a half since I had been in Kronstadt, and what had I created since? Ah, Berezhkov! But never mind, there wasn't long to wait now.

On the other side of the aerosleigh two people were talking. Some very persistent young lady was shooting rapid-fire questions at a harrassed guide.

"No brakes, you say!" a girlish voice exclaimed. "How can that be? This is an aerosleigh, isn't it?"

Where had I heard that voice before? Why, of course. Then, too, it had had the same stern ring to it. It was the very tone in which the prim maid had demanded of Professor Zhukovsky, "Is there such a thing as an aerosleigh?"

I went up. Would that young lady recognize me, I wondered. Would she remember the fellow who had whizzed her down to the door of the children's home on his motor-cycle that spring evening years ago?

Would you believe it—she recognized me at once. "Why, you're Zhukovsky's pupil," she said. And straight away she opened her guns at me, to the immense relief of the guide, who promptly made his escape.

"What is this kolchug-aluminium?"

I mentally thanked Ladoshnikov for having enlightened me on that score, and proceeded to describe the metal as though I had invented it myself.

I observed, during our conversation, that my companion was not at all hard to look at. Another discovery I made was that nothing became a woman so well as shining hazel eyes in combination with golden hair. Hair done up in braids was considered kind of old-regime style those days, and so this charming young lady wore hers bobbed. It was bleached almost white in places. Her slim pretty figure was clad in a light checked costume. All the girls, as I presently learned from Valentina (that was the prim maid's name), had such costumes made for them when they left the children's home.

"So they have turned you out into the world?" I said.

"Yes. And I think I am going to work in the aviation line."

"Splendid!"

And so, in a few days' time, I was to receive a fabulous sum of money. Meanwhile I sauntered about Moscow, spinning rosy dreams.

One evening I decided to go and see the exhibition, in the decoration of which, by the way, my sister had lent a hand. It was the First Agricultural and Handicrafts Exhibition which had just been opened in what was then called Neskuchny Garden. Frankly, I knew very little about the problems of crop engineering, for all that I had had some experience as a miller. Neither the wonderful grain cleaners, which I knew by Masha's accounts to be exhibited there, nor even the gigantic flour-mill machinery of the Krasny Putilovets Plant held any great attraction for me. I'd had enough of flour-mills! I wanted to see some of the other exhibits I had heard about.

The working day was over. The viaduct across Krimsky Val was crowded. A stream of people was making for the exhibition entrance. The red calico head scarves of the girls stood out among a sea of caps. I had become very shabby that last year and looked anything but a dandy even in that poorly dressed crowd. In imagination, however, I saw myself dressed in an immaculate new suit and a smart autumn overcoat.

I went directly to the Metal and Electricity pavilion, which I knew to be the biggest and the only reinforced concrete building at the exhibition. It was a fine pavilion in the form of a hexahedron with six graceful porticos. But most important of all, in front of the slender square columns of one of these porticos, I caught a glimpse of the lovely silhouette of an aerosleigh of the latest construction made of kolchug-aluminium. That same kolchug-aluminium Ladoshnikov had once told me about. I don't suppose he ever gave me a thought out there in Leningrad. But never mind, the day was not far off when he'd hear of me!

The aerosleigh was roped off, but I managed to reach the propeller with my hand and touch the plating. I recalled my trip to Serpukhov, to Kronstadt. It was two

the country. Many youngsters from the children's home had been working there at the "Smichka" farming commune.

"Oh, I see. That accounts for your charming sun-tan and the bleached strands," I said.

Her reply was a withering glance and the sudden announcement:

"I think I'll become a forester."

"A what?"

"A forester. You know."

This wouldn't do at all. I'd have to get her out of this pavilion as quickly as possible. I just couldn't see myself inventing for the rest of my life somewhere in a primeval forest!

I lingered purposely near the exit, and manoeuvred my companion towards a skilfully decorated wall. A familiar hand had painted clusters of ashberries and twigs of maple leaves above the stands. These autumn leaves resembled Ladoshnikov's farewell bouquet.

Valya was delighted.

"If only I could paint like that! I'd become an artist!"

Said I:

"That's the work of my sister!"

Sensation! But I'd better clear out before my sister. Masha ran into us and spoilt everything by saying, "Ah, so you've come at last to visit my miserable place of employment!"

Valentina's respect grew apace. She learned among other things that I had been wounded at Kronstadt (after asking what was wrong with my leg) and that my hands were roughened repairing the Woollen Cloth Mill. At the rate we were going I would be making her a proposal before the day was out!

Dusk was falling. What we needed was a glamorous setting, so I turned back to the Metal and Electricity pavilion. The sky above it was all aglow—there was an inner courtyard there in the centre of which stood a gushing fountain worked by a big centrifugal pump. Just then the fountain was sparkling with a thousand coloured lights. The eyes of my wife to be were sparkling too.

"I don't know. It's difficult to choose. There are so many interesting things all round you."

"There's only one interesting thing in life," I declared emphatically, "and that's inventing. Look what scope you have!" I waved a hand at the Metal and Electricity pavilion, and added with my usual characteristic modesty, "I invite you to next year's exhibition—to the stand with Berezhkov's exhibits. You will see some amazing things there!"

"I'm sure I will!" Valya said. "You're a pupil of Zhukovsky's, aren't you?"

Her hazel eyes looked anything but stern. It was a long time since anyone had believed in Berezhkov. But she believed in me!

Great Ideas are said to come suddenly. It struck me all of a sudden that here was the girl I had to marry. And marry her I would! Naturally, I kept the idea to myself for the time being. I walked at the side of my future wife, listening to her plaint about there being too many interesting things in life. She told me about herself. The "combating-illiteracy" group, the young naturalists' circle, the WIR\*, and what not. A conversation that had less bearing on the problems of engineering. It would be difficult to imagine, but I found it so thrilling that I forgot everything and stumbling over one of the exhibits—a motor-car engine—almost measured my length. I was just dying to take my companion's arm, but I had already had it impressed on me that this was not the done thing among modern youth. We walked on and on. There, stepping out at my side, were slim sunburned legs clad in socks and obviously home-made cloth shoes.

After a while it was borne in upon me that this Valentina of mine was a fickle maid. We went into the Forestry pavilion. It was a magnificent pavilion, I must say. Streamers above the entrance read "The Country's Assets." "Forests Are Our Power and Wealth." Valya dragged me from stand to stand. She grew quite excited and began telling me how she had spent the summer in

\* WIR—Workers' International Relief—Tr

ette of my wife to be. She was leaving me, leaving me, it seemed, for ever

At the corner she stopped, and raised her hand. In the light of the lamp something gleamed and rolled over the ground. She had thrown my present away and was gone. I ran after her, darting hither and thither, but I couldn't find her. Nor did I find the present she had thrown away.

The only consolation left to me was the thought that the nut's twin sister lay in my pocket

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At last pay-day came round. It was a glorious morning. Masha had been looking forward to it almost as eagerly as I had, for she had to pay an urgent debt incurred for the sake of her worthy brother. I remember, it was a first autumn frost and rime lay about here and there.

As you know, I wasn't yet the happy owner of a respectable overcoat (that was still to come!), and had to put on my shabby old half-coat—the only outer garment I had—which was discoloured beyond repair by oil stains and rust. My cap was not exactly brand-new either. Masha looked me over critically, shook her head and slipped her arm through mine. We sallied forth.

I went along, whistling light-heartedly. Masha, too, was humming a tune. At the mill gates, however, I ran into some of the workmen of my repair gang, and from them I learned some staggering news. Several members of the mill administration, including the chief accountant, had been arrested the previous night. Concern for the fate of my cheque made me quicken my step. Masha started to mutter something about her always having been against those stupid contracts and made me quite angry. I assured her that I had nothing at all to worry about. What did these arrests have to do with me? I had earned my money honestly and legally. I had official contracts and acceptance certificates in my hands, I was fully within my rights, and my cheque was safe.

I took her by the elbow, expecting some caustic remark about bourgeois manners. But none came. I did not offer an exchange of rings, but went up to one of the kiosks with her and told her to choose something as a keepsake to remember this meeting by.

The kiosk, by the way, was selling bicycle spares and tools, among them cute little nuts. Shiny, nickel-plated, hexahedral nuts—an exact replica of the pavilion. I bought two nuts, and dropped one of them into the pocket of Valya's checked suit.

"Keep it as long as you live," I whispered.

With the small change I bought my betrothed a hot *pirozhok*, and stood there blissfully thinking that soon I would be able to treat her to a dozen *pirozhki* if I liked.

"Valya," I said, "hurry up and start studying, and we'll work together. We'll astonish the world with our ideas and inventions." Valya stood there with her mouth stuffed full. "We've got marvellous prospects," I said. "In another few days I'll be a rich man."

Valya choked.

"What d'you mean?" she said.

At this point I should have wisely held my peace, but it isn't everyone who can pull up sharp in the middle of a headlong rush.

Out it all came—the future firm of the "Free Designer," and the "Idea Depot," followed by an exposition of certain ideas as to the limitations which a job necessarily imposes on free creative thought.

"Where did you earn such big money?" Valya whispered.

"At the mill."

"But how?"

"Just by using my brains."

And I told her about the contract. I even went to the length of boasting that it required the brain-stuff of a Bereshtkov to make money so cleverly.

Her sunburned face turned as pale as pale can be. What was left of the *pirozhok* I found thrust into my hand. I saw the nape, the straight back, the stern silhou-

A sudden look of keen and searching scrutiny came into his eyes. Caught unawares though I was, I realized that he was sizing me up, forming his first impression of me, and first impressions are rightly considered the strongest. It was perhaps a critical moment. But what could I do? I just looked him squarely in the face, as much as to say—there, look me in the eye, see what a nice open countenance I have. Here you see a man with a clear conscience, a man who has earned his money honestly. But he seemed to have formed a different impression.

He opened the door into the passage and called someone. A military man with a holster at his belt came in. The Inspector said:

"Detain Citizen Berezhkov, will you?"

"It's a mistake!" Masha cried. "He hasn't done anything!"

The Inspector looked at her.

"Don't worry, citizeness. No charge has been made yet." He paused, then added commandingly:

"Take Citizen Berezhkov to my office. Let him wait there with the rest."

The military man touched his cap and said:

"Come along, citizen."

Masha stood clutching the barrier. Everyone in the counting-house started whispering. One could catch the words, "They've taken him." Yes, I was led off.

My place of temporary confinement was the outer office of the assistant manager. I found several other contractors sitting there, evidently waiting to be interrogated. I had had very little to do with these men. Most of them were coarse characters who had made their money in dubious ways, and had little interest for me. But at that moment their company was more than welcome.

"What's happened?" I asked eagerly. "What have they

On entering the counting house I took a swift look round. The staff was working, everyone was in his place. I went up to the wooden barrier behind which stood the desks and asked:

"Can you please help me? The chief accountant told me to come for my cheque today."

The employee I had addressed was about to answer me when a voice came distinctly across the room, asking, "Who are you?"

I turned round and found myself confronting a complete stranger. Somehow I always recognize people who are mentally alert and quick at grasping things. He was one of those people. He stood a little way off, swarthy and rather short of stature, waiting for my reply. Who could he be? The new manager?

"And who are you?" I countered.

He came up and said dryly:

"Inspector of the Department for Combating Economic Counter-Revolution."

A strained painful silence ensued. Out of the corner of my eye I noticed that everyone had stopped working and was staring at me with curiosity.

"Berezhikov," I muttered lamely.

"Contractor Alexei Nikolayevich Berezhikov?"

"Er—yes."

"Very good," he said slowly, eyeing me coldly. "So you've come yourself—saves trouble. Your case is in my hands."

Masha stared at him in silence. I stood dumbstruck too. What did he mean by "you've come yourself"? And "your case"? With legal investigators this could only mean one thing. But what case could there be against me? I was at such a complete loss that I could only stand there like a fool, saying nothing.

There was worse to come, however. His next words sounded sinister.

"You'll have to wait. I'm interrogating the others just now. I will interrogate you later. Meanwhile I'll have to detain you."



He was not alone. Two paces behind him followed a military man

"Well?" someone asked quickly "How is it?"

All eyes in the room stared the same question. A brief incident occurred here which still stands vividly in my memory. The contractor's face suddenly went livid. Stopping in the middle of the room, he shouted furiously, waving his huge fists

"It's a hell of a life! They don't give you a chance to live!"

The escort commanded sharply

"Stop that! Quick march! No talking there!"

The contractor's arms dropped limply, and he muttered with a gesture of disgust

"They've run me in. They don't give you a chance to live!" And he clumped out of the room.

The next contractor was called in. He was there for over an hour, and came out with an escort too. He, too, had been remanded in custody. Hours passed, and our numbers kept dwindling.

The men went before the inspector one after another, and all of them were marched off to jail. Dinner was brought in from the canteen, but I couldn't touch the food. I kept repeating to myself that I was, thank God, entirely blameless, and my conscience was clear, yet I could not shake off an uneasy foreboding of trouble to come. It began to grow dark, and the electric lights were turned on, but the inspector still continued his interrogations. At last I was the only one left. The minutes dragged by, then the door was opened and I was called in.

The inspector was sitting at the massive managerial desk. I caught his eye again—it was as frigid as it had been some hours before in the counting-house. His face was not in shadow, as an interrogator's face should be, if we are to believe most authors. After a whole day spent in interrogating men he was obviously fagged out. The

arrested the chief accountant for? Why have they brought us here?" But they just glanced at me with surly eyes and growled something unintelligible. I continued excitedly, addressing the company at large. "The Inspector just told me that he was from the Department for Combating Economic Counter Revolution. How's that? There's been no counter-revolution here, has there? What have we got to do with it? What can they charge us with?"

"Oh, go and—" someone snapped with a foul oath. Another asked irritably

"Are you a fool or are you just making out you are?"

"I'm not a fool."

"Then you're a bloody nuisance! Maybe you've been planted here to spy on us?"

"What d'you mean?"

"Oh, go to hell! Why don't you leave people alone!"

I found no sympathy here. After a look at the sullen faces I took a seat in the corner. The fellow was right—I was a nuisance. Everyone here was upset, for everyone, at some time or other in his life, had been mixed up in some shady business. For that was what making money really amounted to. I reminded myself of the hints that had been dropped to me about having my accounts squared by means of building materials that were in short supply. That was it—now I knew what the trouble was. Good for me that I had refused even to listen to such proposals and would have no fishy dealings with anybody.

Our Inspector, followed by two military men, crossed the room swiftly without looking at anyone. He had some papers in his hands. A minute later one of the contractors was called before him into the private office. He was a tall burly man with big hands and large feet in high-boots. His face noticeably paled as he got up. The two or three days' growth of beard on his chin suddenly stood out sharper. He cleared his throat huskily as he went. The door shut behind him.

The atmosphere in the room grew tense.

An hour passed in absolute silence. At last, after another half hour or so, the burly contractor came out.

"Well, you see, I didn't quite finish the School of Engineering. By profession I well, er . . ."

"You didn't graduate?" the Inspector broke in.

"No. I had just one or two more exams to sit for."

"And yet you've been giving yourself out to be an engineer?"

"What do you mean giving myself out? When did I do that?" I cried.

The Inspector selected a pencil from a tall lacquered wooden holder and laid it on his desk. The meaning of the gesture was lost on me, but what I did realize at the moment was that he was conducting the examination according to a perfectly clear and thought-out plan.

"So you never called yourself an engineer?" he went on imperturbably.

"I may have done it some time or other, but not seriously. Not in serious matters, anyway."

"Weren't you serious about that flour-mill you opened?"

"Flour-mill?"

In a flash it dawned on me. Why, of course, that sign-board at the mill with the words "Engineer Berezhkov," which my sister and I had so thoughtlessly painted in! But how could the Inspector know that?

"Well, er . . ." I began hastily, "there was one occasion when I called myself Engineer Berezhkov on a signboard. But I didn't mean anything. How can I explain it? You see, that mill was a sort of inspiration. Some inexplicable force was at work."

His eyes narrowed.

"An inexplicable force?"

"Yes. You may not believe me, but it was just a lark to me, an exciting game. And just for the fun of the thing I—"

He interrupted me again.

"How much did you sell the mill for?"

"I didn't sell it. I was swindled out of it."

"Were you? And didn't you get paid anything?"

"Not a kopek! A swindler by the name of Podralsky got all the papers made out in his own name."

"Did you take legal action?"

sallow tints in his swarthy face stood out sharply under the bright electric light. Leaning back slightly in his armchair, he regarded me incuriously as I approached his desk, and for a moment, while crossing the room, I caught a look in his eye that struck a chill to my heart—it wasn't only frigid, it was implacable. I realized with a quickened intuition that my fate, as far as he was concerned, was sealed.

"Sit down," he said.

I complied. Green cardboard folios stood neatly stacked on the desk, pushed to one side. No doubt the dossiers of the contractors who had been remanded in custody, I thought. One such dossier lay before him. He tarried for a moment, then with a faint sigh abandoned his comfortable posture, leaned over towards the desk and opened the file. I had a furtive glimpse of various papers, and on top of them all, my cheque. The Inspector drew a blank form out of his brief-case, headed in bold type "Examination Record," and placed it on the file with the laconic warning that false statements were a punishable offence. From the stories I had read, I expected him to open the proceedings by offering me a cigarette or a cup of tea, or dropping into an easy desultory conversation calculated to set the criminal more at his ease the better to be able to catch him off his guard. But the man who sat across the desk did nothing of the kind. He got down to the business in hand without any preliminaries or cigarettes and such like.

"Name?"

"Berezhkov."

He wrote it down. The usual questions followed in quick succession.

"First name, patronymic? Place of birth? Age?"

I answered them, and he wrote them down.

"Profession?"

I had often answered that question with aplomb. "My profession is that of a dreamer." But obviously this wouldn't do here.

After a slight hesitation I answered

"What? I'm guilty of no crime! Every ruble I have made here has been honestly earned. I can account for every kopek. I don't know what crimes you are talking about."

The inspector laid a third pencil down in a row with the others. Suddenly the meaning of that gesture became clear to me. He was absolutely convinced that I was lying again. Those pencils were his way of ticking off my lies. The three pencils stood for three lies. How the thundering blazes was one to prove to him one's innocence!

I whipped my wallet out of my breast-pocket.

"Here!" I shouted. "I have all the agreements and vouchers with me."

He checked me with a gesture of his hand.

"Don't bother. I have copies of all those papers too. Don't get excited, sit down, think it over calmly. I can wait. Have some water."

"I don't want any water!"

I sat down gloomily. He turned over the leaves of the dossier, lingered over one of them, then looked up and resumed:

"Well? Aren't you going to speak?"

I answered in all sincerity:

"I swear to you. I don't know what you're talking about."

He was unimpressed. His voice, when next he spoke, had an edge to it.

"Very well. Then I'll tell you myself."

Tersely and clearly, with inexorable logic, he set forth my crime to me. I sat crestfallen, listening. My accuser had every figure, every date right, the case he was building up against me was watertight in every detail. He didn't leave me a leg to stand on. Faced with the weight of all that evidence, I found myself listening, fascinated, to his speech and almost beginning to believe myself guilty.

The chain of evidence was roughly as follows. To begin with he told me how I had received my first contract.

"You got it at a time when the members of the mill management, who are now under arrest, had not yet

"No I didn't want to have anything to do with him."

I see," the inspector said.

He took another pencil out of the holder and laid it on the desk. I stared blankly. What was he doing with those pencils, I wondered? Why was he laying them out on the desk?

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He paused, as if giving me a chance to add something, then said crisply

"Am I to understand, then, that you gave your mill away as a present?"

The relentlessness that I had caught in his eyes was now apparent in his voice. I was in despair. Twice within a few minutes he had caught me out as a liar. What was I to do? How could I persuade him, make him change that terrible decision, which I read again in his eyes? I realized to my horror that words were now powerless, yet I plunged on.

"Oh, no, you misjudge me. I have nothing to conceal. I give you my word I did not sell the mill."

The inspector merely shrugged his shoulders. Obviously he didn't believe a word I said.

"Let's get your profession straight, then."

He dipped his pen in the ink and began writing, uttering the words aloud

"Private businessman, tradesman."

"I'm not a tradesman!" I shouted.

"All right, then let's put it like this. Private businessman, contractor."

I said nothing. I felt crushed. He laid his pen down and said

"I know all about you. There's only one way you can make things easier for yourself, and that's by telling us the whole truth."

"What about?"

"About the crimes you have been an accomplice to here."

I leapt to my feet.

He jerked his head towards the neat stack of dossiers pushed to one side of the desk.

"The culprits have confessed in face of the evidence brought against them," he proceeded. "You have been doing the same thing. Under the second contract, which you have recently completed, you were again due to receive an enormous sum of money, even making allowance for all your expenses. For three weeks' work you were to pocket a sum many times in excess of what any honest engineer in the state service could have earned in the same period for the same work. In this particular case we are dealing with a crime on the part of the management of this mill. D'you mean to tell me that you didn't know of it? It's no use acting the innocent lamb, trying to fool the law! I'm giving you this last chance to make things easier for yourself by a frank confession. Who were you in collusion with? Through whom did you give bribes?"

"I gave bribes to no one."

"You deny the charge then?"

"I do."

"In that case how do you account for the fact that you were allowed to help yourself out of the public purse to a sum of money a hundred times in excess of what any experienced engineer would have received for the same work at the highest existing rates? The others were allowed to do this because they gave bribes. And you? Was it just out of courtesy? Or was it through the intervention of that inexplicable force again?"

That was the second time he had repeated that phrase of mine, and each time with ironical emphasis.

"Yes," I said defiantly, "it was that inexplicable force."

"Is that all you have to say in your defence?"

He paused. Struck by a sudden inspiration, I did not speak either.

"Very well, we'll leave it at that," he said grimly, "I suppose you realize that the law is not concerned with inexplicable forces?"

"And what about talent?" I cried. "Isn't that an inexplicable force?"

taken to the path of crime. They signed a contract with you, but there was no actual collusion. Of course, in carrying out that contract you enriched yourself at the expense of the state, but without committing any chargeable offence."

He named the exact sum payable to me for the repair of the gas generators, which, allowing for all my expenses, came to about twenty-five thousand rubles for eight months of hard dirty work, and worked out at about three thousand a month.

"The chief engineer of any big state factory gets five hundred a month," he went on. "You raked in many times as much, but still it wasn't enough for you. You're out to get rich quickly, I see. And your opportunity came when responsible members of the mill administration took to the path of corruption. Here's where that inexplicable force of yours came into play again."

He uttered the words contemptuously. It was his mode of procedure first to state the bare incriminating facts in a cold impassive manner, then suddenly to give rein to his feelings in a tone of withering scorn that hurt like the lash of a whip.

I swallowed the pill with a shudder. It was no use waxing indignant and shouting. The only thing that could help me was proofs to the contrary, but by this time I had realized that I hadn't any. I had grasped his chain of logic to the end—and at the end of it stood ruin for me.

After another lashing phrase or two, the Inspector proceeded to state the facts again in an outwardly impassive manner.

"The crimes at the mill," he said, "started some months ago. Public money was embezzled in various ways. Some people here started taking bribes. For a bribe materials which are in short supply in the country found their way from here to the private market, for a bribe faulty repairs were accepted and paid for; for a bribe contracts were signed here under which private businessmen were allowed to fleece the state. These crimes have now been exposed."



I picked up the sheet of paper and said triumphantly "This is an absolutely perfect circle. Check it. Send for a pair of compasses. Here, watch me centre it."

I laid the paper down again and dotted the centre with a single movement of my hand. Then suddenly I gave a start. The circle was out of true. I would never have thought a thing like that could happen to me, but there it was—I could not mistrust the evidence of my own eye—the eye of a designer. My own talent, my own hand had played me false. It was a terrible thing to disgrace oneself, a terrible thing to land in jail, but more terrible still to me was the loss of my talent. It dawned on me at that moment that I was losing it. The words "businessman, contractor," seemed to be burning through the paper. I stared at the pencil in horror, as though it really stood for some monstrous lie in my life, or rather pointed to the fact that my life had gone wrong somewhere, that I was on the wrong track. I can't tell you what I suffered at that moment!

Luckily the inspector wasn't looking at me. The drawing claimed all his attention, and he stood up to examine it. I had already recovered myself sufficiently to realize that I had to follow up my advantage without losing a precious moment.

"A geometrically perfect circle," I repeated confidently, "and here's its centre."

I pointed to the pencil dot I had just made, the dot that had revealed to me with such a shock the inaccuracy of my circle.

"Check it. Send for a pair of compasses. Here's another circle."

I spread the sheet of paper and drew another circle on it. What the—! My hand had gone wrong again. One of the segments was slightly out again. A professional eye or a pair of compasses could have detected it easily. I felt like flinging my pencil away in utter despair, but I controlled myself and said coolly:

"Now, here are some concentric circles."

This is perhaps the most difficult thing in drawing—I mean concentrically reproducing a faulty circumference

The inspector looked at me closely. Apparently that argument took him by surprise. I rushed on. There are words that a man instinctively avoids when speaking about himself. But a desperate man breaks all conventions. And I was desperate.

"What if I am a man above the average level?" The words came tumbling from my lips. "What if the man sitting in front of you at this moment is endowed with more than ordinary gifts?"

His mouth, etched in that firm clear line, which, I had often noticed, was the mark of a preeminently analytic mind, curved in a faint ironical smile.

"What of it?" he said. "We have no supermen. A crime is a crime, no matter who committed it."

"What of it?" I queried, still tingling with the fire of inspiration. "Give me a sheet of clean paper."

For the first time a look of interest gleamed in his eyes.

"Here you are."

He held out to me the form with the printed heading "Examination Record," which had been lying in front of him almost unused. I caught the words "Private businessman, contractor." You wait, I'll show you who I am, the vindictive thought flashed through my mind. I turned the sheet over, clean side up. Among the three pencils, which the inspector had laid down as a record of my three lies, I had noticed a sharply pointed carbon pencil, admirably suited for free-hand sketching.

I wiggled my fingers to exercise them, then snatched up the pencil, and with my elbow resting on the desk drew a geometrically perfect circle at a single stroke. This was no trick. I had always been good at drawing ever since a boy. My father had helped me to develop what was a natural gift. By the time I was in the senior forms at school I could draw like this without the aid of a ruler or compasses. Circles, semicircles, arcs—they always came out perfect from under my pencil without the slightest effort on my part.

which I had developed by hard work at drawing and designing. True, I had not designed or drawn anything of importance in the last few years, but my recent electrical installation and fitting job, which calls for accuracy both in drawing and execution, had been good eye practice.

The Inspector put the rule to the paper, shook his head again, then, with a smile, suddenly said

"Measure off twenty-two millimetres, will you?"

"Twenty-two? Certainly."

Standing up, I marked off another section of the line on the same sheet of paper. The Inspector, with the same smile of curiosity, put the rule to it. My mark tallied exactly with that of the rule.

"Yes, a remarkable talent," he said.

It was my turn to smile, and I did it hugely, beaming with satisfaction.

### 30

Thinking back, however, I believe that the Inspector, surprised though he was, had something at the back of his mind when he uttered that phrase. The knack of free-hand drawing and spacing off measurements does not necessarily stand for talent. A man, for instance, who can add up long figures in his head faster than a calculating machine or compose rhyming verses offhand is not necessarily a person of talent.

It was pardonable for me to forget that in the excitement and distress of the moment. But not so with my interrogator, who, apparently, was perfectly well aware of it. And yet he had said, "A remarkable talent."

"An inexplicable force," I said triumphantly.

He took me up quickly:

"You think so? Is that how you define talent?"

He was now talking to me not in the tone of an interrogator, but in the free and easy manner of one intelligent man discussing with another the mysteries of nature.

on a different scale. It's hard to do even with special instruments. Any new inaccuracy, however slight, becomes glaring. On the other hand, if I succeeded—and I no longer believed I would—the illusion that all the circles were absolutely perfect would be complete. Here goes then! At one stroke I drew a concentric circle that exactly followed the curvature of the first one. I could hardly believe my own eyes. Whew, I had done it! My disgrace, of which I alone, so far, was aware, had been wiped out at last. Illusion had won the day, the faulty circle was disguised. Another stroke! Another concentric circle. Good, I had done it again! Wasn't it a beauty! My eyes must have been shining, my ears were tingling and my face was flushed, the Inspector, a shrewd, hard-headed man, was looking at me with quite different eyes. They registered surprise. And I kept him in that state.

"Here's a straight line. Here's a parallel one. Another parallel one. Here's a perpendicular."

The lines were faultless. I traced them by hand, firmly and cleanly, as if I was doing them with a ruler. The pencil left a dark heavy line. The effect was striking. But I still had a last stunning trick up my sleeve. I took out of my pocket a slide-rule—I always had one on me—and a penknife.

I picked up another pencil and quickly sharpened it to a needle point. Then I drew another straight line—a very fine one.

"Now I'll space it off," I said. "Please note I am doing it by sight as accurately as this instrument here."

I pushed the slide-rule towards the Inspector and began to mark off the line with the lightest of pencil strokes, announcing as I went on:

"Two millimetres. Six millimetres. Eight. Twelve. I am numbering them. Will you please check it?"

I gave the Inspector a sheet of paper. He picked up the slide rule, shaking his head self-deprecatingly as it were, then smiled and started to measure. I had no doubts about my measurements being correct.

This knack of being able to mark off measurements with perfect accuracy was another of my boyhood gifts,

talent through the dirt? You did offer a bribe here now, didn't you? What made you do it?"

This was the last trap he had set for me. Perhaps he thought I would fall into it, or indirectly give myself away by maintaining a shamefaced silence. I flared up and sprang to my feet.

"Damn it all, look at me! D'you think I put this jacket on today specially for you? And these boots? Just look at them! Why, I hardly saw anything of the money you're talking so much about. Where the blazes then could I have got the money to pay these bribes?"

The inspector deliberated.

"All right, Berezhkov," he said gruffly, pressing a button. One of the men in military uniform came in.

"I gave orders this morning for contractor Berezhkov's workmen to be here," the inspector said to him. "Are they?"

"Yes. They're waiting outside."

"Ask them all in. I shan't need you for the time being, Berezhkov. You'd better wait outside. I'll call you in again later on."

31

I went out and sat down to wait. Outside the window it was dark. A solitary electric lamp burned faintly under the ceiling. What was poor Masha doing, I wondered. Going without her supper, for one thing. I sighed, and rummaged in my empty pockets. Hullo, what's this? The nut I had bought at the exhibition. It flashed across me that if I was searched it would be taken away. I thought of the girl who had thrown it double away. What would she think of me now?

I went over my recent conversation with the inspector. I believe I had managed to convince him of my innocence. And if I hadn't? What would Ladoshnikov, Ganshin and Fyodor think of me?

The minutes dragged by as I sat there brooding over my fate.

"There is a Russian proverb that runs 'Talent in man is like a frost on the ground,'" I answered. "That's a popular definition. An elemental force—'like a frost on the ground.' "

I sounded confident enough, but actually I felt that this definition was not altogether adequate and complete. My thoughts flashed back to that panicky moment when I had repeated to myself, "I am losing my talent, I am losing my talent." I recollected the circumference that I had drawn out of line, the failure that had been visible to me alone. There was something wrong with that talent of mine, something that I could not exactly put my finger on.

"Yes, an inexplicable force," I repeated doggedly. "Call in an engineer—any one. Give him a ruler and a pair of compasses, and it will take him a minute to do what I do in a second. The ratio, as you see, is one to sixty. Or maybe still more. Well then, am I entitled, working, say, at drawing, to earn in a perfectly honest way sixty times or a hundred times as much as that engineer?"

"Formally, yes. But actually, in this particular case, I should say—no, you are not entitled to it."

"Why not?"

"You are not honest," he said gently. "You've caught the money-making disease. You are not being fair to yourself, to your talent. Instead of giving yourself up heart and soul to a big idea, a noble aim, like all great inventors and artists have done, you have prostituted your talent for the sake of lucre."

I sat listening to him with drooping head. This man, who—I am sure of it—had not noticed how my hand had failed me and what horror and shame had overwhelmed me at that moment, had grasped something that lay deep below the surface—speaking plainly, he had seen through me.

He went on in the same gentle tone.

"Can't you find anything better to do? Money-grubbing is a dirty business at all times. Why drag your

seem to be the only contractor who has personally taken part in the actual work, conscientiously carried out his contracts and not made use of materials from state-owned warehouses for speculative purposes. True, you were to be paid exorbitant fees, but actually the money was not received by you, and so no charge is being brought against you."

Although I had been expecting such a decision, a hot wave of joy flooded my breast.

"I've had a long talk with your friends, too," the inspector went on. His eyes, which an hour or two before had been so hard and implacable, suddenly lit up with a gleam of amusement. "I hope you won't forget our conversation. You may go now. You are free."

Naïvely I asked.

"What about my money? My cheque?"

"That cheque has been sequestered. It will remain in the file," the inspector said coldly.

"B b .." Suddenly I found myself stammering. "But that money is legally mine by contract. I haven't even got any money to pay off my workmen."

"I don't think the law will be on your side in this matter. It's a case of criminal negligence and mismanagement on the part of the administration."

"But you admitted yourself I had a rare talent, didn't you?"

"Is talent the exclusive privilege of private businessmen? Haven't we got talented people of our own, isn't there room for talent in our system of state-run industry? Excuse me, but I just can't accept such an idea. You can take the matter to court if you like. For my part I shall recommend payment being made at the official rate on the basis of actual time expended."

I was about to protest that this money would not even cover what I owed my workmen, who had been hired at anything but official rates, but the inspector wound up curtly:

"I wish you good evening. Don't let me detain you."

I went out into the street. It was drizzling. Slanting shafts of light streamed from the windows of the mill.

All the workmen of my gang were escorted into the inspector's room. I was eaten up by anxiety, although I never doubted for a single moment that the men would corroborate my evidence.

In about half an hour they trooped out again. Then the incredible happened. Who should come into the outer office but Ladoshnikov and Ganshin! They were being ushered into the inspector's room. Ladoshnikov headed the little procession, looking down at his feet in their big top-boots. It was a wonder he noticed me at all.

"Alexei!" he cried.

"You! What are you doing here?" was all I could say.

"I flew over by plane. The LAD-3. I got Masha's wire this morning, and."

The escort cut short our conversation. Ganshin, who had become almost a professor by that time, bucked me up with a smile. Like all his smiles, though, it had an ironical twist.

Presently I was left alone again. My two friends had gone into the inspector's room. Time dragged on still more drearily, and the suspense was worse than ever. Ladoshnikov's words suddenly echoed in my ears. "Flew over by plane. The LAD-3." A metal airplane, made of kolching-aluminium. Was the thing ready so soon? Ladoshnikov had lost no time.

Come to think of it, though, it wasn't such a short time. It was two years since we had seen each other last. I had challenged him then, "Give me two or three years and you'll see what a free designer can do!" And now we had met!

I don't know how long I sat there, waiting to be called in. My friends passed out, and neither of them attempted to exchange a word with me. It struck me as being a bad sign, although neither of them looked particularly dejected.

The thing was cleared up when I was escorted into the inspector's room again.

"Well, Alexei Nikolayevich," the inspector said, using this more intimate form of address for the first time, "here's my decision. Of all those I have interrogated you



again. He tossed it up Heads or tails? It was heads. A good sign, that. His mind made up, he dropped the coin in the slot, lifted the receiver and gave his number—the number of Professor Shelest's telephone.

"Hullo," a voice came across the wire.

"Is that Professor Shelest?" Berezhkov asked, forcing a cheery note into his voice.

"Yes. Who's that speaking?"

"It's me, Berezhkov."

He expected an exclamation of some sort, a word in response, but Shelest said nothing. At last the voice at the other end said

"Berezhkov? Who's Berezhkov?"

"Professor, you can't have forgotten me! Don't you remember us building the aerosleighs together? And afterwards—well, it's me, Berezhkov, your pupil."

"Ah. Very glad." (He didn't sound it.) "What can I do for you?"

"I have an invention, Professor. If you don't mind I'd like to show it to you."

"I'm sorry, but I can't spare the time."

Berezhkov asked naively

"Why?"

"We settled it once and for all, I believe, that your inventions are not in my line."

"But this is something quite different, Professor. I've designed a wonderful—"

Berezhkov remarked that at this point he had stumbled over his words in the most abject manner. The boastful flavour of that pet phrase of his smelled a mile off, and he had intended to be modest and humble. The word had escaped him however, nature had asserted itself. And Berezhkov took the bit between his teeth, all his good intentions forgotten.

"—a wonderful thing. There's been nothing like it since the day of creation. It's—Are you listening?"

"Yes."

With a glance at the door of the call box Berezhkov resumed, dropping his voice.

I could hear the pounding of the gas engine. Last minute preparations were being made there for the start up. I stopped. I clearly remember my sensations at the time. I felt as if I were standing alone at some wayside station, looking at a brilliantly-lit train that would rush off in a minute or two and leave me standing there all alone again. I longed to see my friends—Ladoshnikov, Ganshin—to thank them. But no, they were the last people I cared to meet just then. I did not want them to see the abject failure that I now was. Wait! Give me time! We shall meet, but in other circumstances. My name's not Berezhkov. If I don't pull off something marvellous, unheard-of, terrific! There'll come a day yet when I'll go to Ladoshnikov with the real Thing, when I'll show him my new construction—an engine so powerful, so remarkable, that he'll be able at last to build that big swift aircraft he had been dreaming of for so long. But just now I would keep away from my friends.

Fatigue made itself felt more and more. I trudged along under Moscow's clouded evening sky. It was not black now, that sky, as it used to be in those bleak years of economic chaos. It was underlit by thousands of city lights, street signs, and glowing windows, and throbbing with the incessant flickerings of tramcar trolley arms. How much longer would I be trying to find my place in this vibrant pulsating world? How long would I be astonishing it?

32

Berezhkov's narrative proceeded as follows.

One evening, about a month after his interrogation by the inspector, found Berezhkov contemplating a telephone box in a chemist's shop. A glance at his shabby old jacket and patched worn down boots told one clearly that the tin of enamel paint had not yet been put to the use for which it was intended. Before going into the box he passed up and down several times, although it was unoccupied. At last he opened the glass door, stepped inside and shut the door tight behind him. He got out a coin, then hesitated

again. He tossed it up Heads or tails? It was heads. A good sign, that. His mind made up, he dropped the coin in the slot, lifted the receiver and gave his number—the number of Professor Shelest's telephone.

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"... a wonderful thing. There's been nothing like it since the day of creation. It's—Are you listening?"

"Yes."

With a glance at the door of the call box Berezhkov resumed, dropping his voice.

"It's an engine of an entirely new type. I can't explain it over the 'phone, you understand. Let me show you the drawings, Professor."

Again there was silence. Then Berezhkov heard

"Very well. You may call at my flat at six tomorrow evening."

And so the next evening he was approaching Professor Shelest's door in a state of considerable excitement. He had with him a roll of paper with several drawings of his construction—so far it existed only on paper. He was nervous, but hopeful. Nervous because of his shabby appearance, and hopeful with a buoyancy that never flagged that the rolls of drawing paper which he carried so lovingly under his arm would revolutionize engine theory the world over.

33

In telling the story of his life, in which technical ideas, the schemes and conceptions of a born inventor and designer were interwoven in an intricate pattern like so many cross veins, Berezhkov tried to describe those ideas in a way that would make them intelligible—crystal-clear, to use a favourite expression of his—to the layman.

At my request he dashed off in less than a minute a sketch of the remarkable engine he had gone to see Shelest about.

"Imagine a primus-stove," he explained to me. "An ordinary primus-stove. Imagine further that we imprison its flame in a horizontal tube. Then we begin to blow air through that tube and set up an air-flow. For that purpose we fix a forcing fan with a small starting motor at one end of the tube. The air, heated by the flame and consequently greatly expanded, will rush out at the other end in a vortex of tremendous force. I suppose you wonder how the heated air is to be prevented from spreading in the opposite direction? Quite simple. We bend the burner like this, see? Now the jet of flame, under tremendous

pressure, rushes towards the mouth of the tube. We have now created an air-flow. Next we get the air-flow to act on the blades of a steam turbine (slightly modified, of course), and then we can just sit back and watch it. The thing will rotate by itself so long as there's fuel in the tank."

Such was the simple, and to Berezhkov's mind, the great idea of the remarkable engine that he was going to see Shelest about.

"Please, come in," said Professor Shelest.

The highly polished parquet in his study shone like glass. As luck would have it, it was thawing outside and Berezhkov had no goloshes. He had been quite a time scraping his wet boots on the mat out in the hall. Standing now in the doorway he felt acutely embarrassed at the thought of the wet tracks his boots would leave on the polished floor.

Shelest was sitting at his desk in an upholstered leather armchair. Tearing himself away from what he was doing, he did not get up to meet his visitor, but sat regarding him coldly. But when he saw the flush of embarrassment in Berezhkov's cheeks, the hard look of his grey eyes softened and a humorous twinkle came into them.

"Come in," he said more kindly.

Berezhkov walked up, sat down, and laid the roll of drawings on the desk next to him. He was too agitated to speak.

"Is that the wonderful thing of yours?" Shelest asked.

"Yes."

"Well, let's see it."

Berezhkov feverishly untied the bit of string and took off the newspaper wrappings. Shelest stood up, took the drawings and sat down on the edge of the desk with his legs crossed, facing the electric chandelier. He showed a dark profile bent over the white open sheet. His iron-grey hair still retained its youthful gloss.

"See the idea, Professor—a jet of flame." Berezhkov began to explain.

"I see, I understand. Truly a remarkable discovery."

'Isn't it?' Berezhkov exclaimed. There had been a touch of irony in Shelest's tone, he fancied.

"Yes. Gas turbines have been considered impracticable because of their low efficiency. But it looks as if you have exploded that fallacy. I don't see your calculations, though."

"I er . . . I haven't done them yet. This is only the first sketch. Just the idea. You see, a jet of flame under tremendous pressure."

"H'm. Tremendous pressure? And what's going to happen to your fuel?"

"I don't understand."

"Oh, you don't? It'll be turned into what we call 'Zelensky fluid'—an incombustible."

"But . . . but in that case the pressure could be—"

"In that case," Shelest broke in crisply, "allow me to acquaint you with a certain work."

Thousands of books were ranged along the walls of the study on massive shelves. Shelest kept sets of numerous Russian and foreign technical periodicals, which he lovingly bound himself on a home-made binding machine. He quickly found the book he wanted—a thick volume—and handed it to Berezhkov. It was a new edition of his fundamental course of lectures entitled *The Internal Combustion Engine*.

"Have you read that?"

Berezhkov nodded uncertainly. He had attended Shelest's lectures as a student, and had grasped the subject and passed his examinations easily, almost without glancing at his textbooks. But this edition of Shelest's book was new to him.

"You will find that wonderful idea of yours dealt with here," Shelest continued ruthlessly. "For your information, it has been investigated practically and theoretically both in this country and abroad. You might at least have taken the trouble to find out what has been done before you in this field. Meantime, my advice is this: tie this thing up with the bit of string again, and don't ever show

it to anybody else. Is there anything more I can do for you?"

Berezhkov did not answer. Shelest glanced once more at the drawings, then at their crestfallen author, and said

"I have a vacancy at my institute for a junior draughtsman. I can let you have that job if you want."

"Junior draughtsman?"

"Yes. I can give you a note if you like, and you can start work tomorrow."

"Work?" Berezhkov queried again. "No, Professor, never!"

"Sorry, that's all I can offer you."

"Thank you."

Berezhkov rolled up his drawings, gloomily took his leave, and started for the door. He saw the now dried traces of his worn-down old boots on the parquet. In the doorway he paused, turned round, and said in a barely audible voice

"All right, give me the note."

34

At last he came trailing drearily home. He tossed the crushed roll of drawings on the chest in the passage. His sister came running out, but she asked no questions. She had no need to

"Go and lie down, Alexei," she said. "I'll bring you something to eat in a minute."

"I don't want anything."

"But go and lie down, do. Warm yourself. I've heated the stove in your room."

"I don't want anything. Leave me alone. I'm done for."

"What you need is a good sleep, Alexei. In the morning you'll be your old self again."

"I won't. In the morning I'm going to work."

"To work?"

"Oh, don't pester me. Can't you leave me alone!"

His sister made him something to eat and brewed some tea then made him take off his boots and put on dry socks warmed at the stove. And he, her pet, her darling, did nothing but moan, repeating:

"Leave me alone. Go away. I don't want anything."

"But you'll forget to shut off the stove and all the heat will go up the chimney."

"Up the chimney? My life's gone up the spout!"

Left alone, he lay there for a long time without undressing. The tin of enamel paint stood inviolate on the top shelf. Before going to see Shelest that day, Berezhkov had struck a pose in front of that tin, declaring with a triumphant flourish of the rolled-up drawings, "Now or never!"

Aye, never. He got off the bed, took the tin down and pried the lid open with a penknife. The paint had dried and thickened, and its brown dull surface had little cracks running over it. Berezhkov poked his finger in it. There it was, that delightful paint, which he had so often used in imagination to paint his own car with and the warm rich colour of which he had lovingly likened to the browned skin on scalded milk. Would he never see it making a smooth silky coat on metal under an elastic brush? He had put away a special paint-brush and a large bottle of clear nut oil for that occasion. He got them out, brought in a clean saucepan from the kitchen, put a few chunks of the thick dried paint into it and mixed it thoroughly with oil.

Then, the saucepan and brush in hand, he tiptoed to the door, opened it warily and stole back into the kitchen. In the lumber-room he found an old watering pot. He carefully spread some newspapers on the kitchen table, laid the watering pot down on it, dipped the brush in the paint and made his first stroke. The brush moved with a soft swish. This wouldn't do, though. Not enough scope. He stepped back to survey his handiwork. No, it wasn't the thing. The old paint hadn't been cleaned off, and the places where it had peeled showed through the fresh coat and looked rough and blobbed. No, his car wouldn't look like that. The paint would make a smooth attractive coat



only on a clean glossy surface of metal. Now what could he paint? Ah, that was it!

A large galvanized iron trough in which the washing was done hung on the wall. Berezhkov passed his hand over the metal. Yes, just the surface he needed. He stood the trough up on a stool, with one end leaning against the wall at a convenient angle, dipped the brush in the pan and started painting again. Now that was better. Splendid! Wonderful! A delightful shade! The electric lamp was reflected in the fresh enamel with a brilliant point of light. Berezhkov jumped up and gave the lamp a gentle flick. The gleaming spot on the painted metal was set swaying, throwing out tiny cones of light. That is how the sunbeams would be reflected in the smooth gleaming body of the car as it raced down the road, rocking on its springs.

But, my God, this was just a trough! A battered old trough, symbol of a ruined life! He couldn't look at the thing any more. Farewell, for ever farewell, beloved tin of enamel paint!

He went back to his room. The partly used tin drew him like a magnet. He took it tenderly in both hands, as if it were a child, and held it so for a while. Then he knelt before the stove, which had nearly burned down already, leaving a heap of red-hot coals over which blue little flames flickered. By the side of the stove lay splinters of kindle-wood. He broke off a splinter, dug out some of the paint with it and threw it on to the glowing coals. It started smoking and bubbling, then flared up like fireworks. Berezhkov sniffed the air to see whether it smelled of burnt paint. But it didn't. The stove was drawing well.

A host of memories came surging back as he gazed into the fire. Here, with a flash, he saw his snap-switch. It lit up the room with a brilliant spurt of flame, and then. Then all that remained on the coals was a light dead ash. Here was his world-famous Idea Depot. Then came flickering glimpses of the flour-mill, of the dream-engine,—his whole life as a free lance, a free designer, a man who was his own master, went up in flames. To-

morrow he would get back into harness, say good-bye to his freedom, become a drudge. Ah, well, it couldn't be helped—his life had been a failure.

38

The next morning nevertheless, found him in quite a different mood.

"It happens sometimes," Berezhkov said to me, "that on getting up in the morning you can't remember for the moment what happened to you the night before. There is a moment of semi-consciousness the first sensation that comes right after sleep, that remains stuck away somewhere in the memory."

His first sensation on awakening that morning was that something remarkable, something unusual was going to happen. The next moment he recollected what it was, he was going to start work that day as junior draughtsman. That familiar inner voice suddenly spoke up, "Get up great deeds await you!" Berezhkov burst out laughing as he lay in bed. Great deeds—the irony of it! Yesterday's dismal thoughts were gone, though. He sprang out of bed, wide awake and buoyant, and stretched himself till his joints crackled.

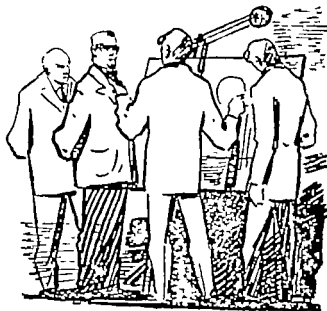
He dressed with a feeling of mounting excitement, with that sense of strangeness and expectation still strong upon him. His sister fussed around him as if she were seeing him off to school for the first time. Before leaving the house he was subject to a careful inspection. The fresh crease in his trousers, the white starched collar, and the bright tie provided a touch of elegance, if not dandyism.

"A shabby dandy," he remarked, gazing with rueful humour at his patched old boots, which were polished up to shine like a mirror.

His face, however, showed no sign of wear and tear. His eyes had a youthful sparkle in them. He turned round in front of the looking glass, adjusted his tie, and smiled.

His threadbare coat, though, was a source of keen mental suffering to him—to use his own words. The frayed cuffs had been snipped off and hemmed in, and this made the sleeves shorter. Berezhkov complained he looked like a boy who had grown out of his clothes. But never mind, he'd take the coat off in the office.

With two sandwiches in his pocket for lunch and thirty kopeks for tram fare, Berezhkov kissed his hand to his sister and sallied forth upon his life's second voyage.



THE ADV-100

1

And so Berzhkov started work as junior draughtsman at the Research Institute of Aircraft Engines, called for short in Russian ADVI.

In those days the Institute was housed in a single room I saw it. Berzhkov took me there one day. It was not a very large room as rooms go—about thirty or thirty five metres square—and had two windows. And that was all the premises the Institute, founded by Professor Shelest,

could boast of at the time. The bookkeeper and the secretary were accommodated in a corner of their own in the building next door.

Berezhkov was given a desk, drawing paper and instruments and started sharpening his pencils in anticipation of getting something to do. Being a new man, however, he was allowed to do nothing but take his bearings the first day.

The room was pretty crowded. There were some ten or twelve people—draughtsmen and design engineers—working in it at sloping desks. Berezhkov sat listening to the low-voiced conversation. Sometimes he got up, threaded his way among the desks, and stopped to look at the drawings, taking care not to be in anyone's way. All the desks were drawing and calculating Shelest's design of a two hundred horse-power aircraft engine. A general view of it hung on the wall in a wooden frame. Berezhkov stood for a while examining it. The projected engine was called the "AIS" (the initials of A. I. Shelest).

Its inventor and head of the Institute, the fifty-year-old professor, turned up towards the end of the working day brisk, energetic and masterful. With a nod of greeting to the room at large, he went over to the desk of engineer Lukin, the head designer. The latter, a good natured man with fair hair and a tendency towards stoutness, got up with a defensive little smile and gave Shelest his chair. They began talking in low tones, discussing the drawing that lay on Lukin's desk.

Without thinking twice, our junior draughtsman left his seat, walked across the room and planted himself behind Shelest's chair. The professor glanced at him out of the fall of his eye with annoyance, as if to say, "Who's invited you, sir?" But Berezhkov stood his ground. He was rather thick skinned in such matters.

Shelest resumed the conversation, ignoring him entirely. Berezhkov stood there for some minutes, examined the drawing first from one side, then from the other, then walked back with an air of utter unconcern, as if he had merely been taking a turn about the room to stretch his legs. However, one must not forget Berezhkov's extraor-

dinary knack of grasping things at a glance, his amazing quickness of apprehension. Insensible in some matters almost to the point of deafness, he possessed in his own particular sphere an astonishing eye and keen sense of hearing. By merely glancing at the drawing and listening to a remark or two of Shelest's he had fully grasped what it was all about.

The situation from what Berezhkov could gather, was as follows: the designing of the engine was nearing completion: the main sections and the assembly drawings had been executed: the design as a whole had been worked out with the exception of one important detail—the cylinder head, which was heavy and clumsy, and did not fit into the space provided for it. The designer was unable to hit on a convenient arrangement for the valves, and solve the problem of valve gear. Failure to solve the cylinder head problem meant failure of the design as a whole, or entailed at best, a revision of the whole lay out.

## 2

The drawing of that cylinder head lay on Lukin's desk. He looked at Shelest guiltily. They had sat at that desk many a time, discussing the problem. Lukin had drawn the unfortunate cylinder head in all ways he could think of, but it had remained as clumsy as ever, an unsolved problem. The working day was over. The ADVI staff went home. Passing the director on their way out, they wished him good afternoon and received a silent nod in reply. Shelest had no intention of leaving yet. He called over engineer Nieland, chief of the calculating section, and another designer to consult them about the cylinder head. Berezhkov was strongly tempted to go up to them again, but he checked the impulse.

He left the building and made for the tram stop, but passed it absent mindedly. He lived a long way off but he wanted to walk home, just swing along by himself. He was excited by his first day's work. His thoughts, as he strode along, were still in that office with the unpainted

sloping desks, they passed before him, those desks, together with the faces at them, the drawings, the snatches of conversation, he saw the engine drawings his future colleagues were making, the swarthy profile of Professor Shelest bent over the elusive detail.

And suddenly—at first vaguely, then more distinctly, until all the details and dimensions stood out clear and sharp—he visualized in his mind's eye a very elegant and very light cylinder head. The valves, which had stubbornly refused to fit into Lukin's scheme, were daintily (to use Berezhkov's own expression) disposed on it.

With an odd smile on his face that went unnoticed in the falling darkness, Berezhkov walked down the streets, seeing nothing before him but that cylinder head. At home he ate his dinner hastily, answering his sister's questions with absent-minded monosyllables and a vacant stare, then sat down at once to draw the image that was fixed in his mind. In telling me of this Berezhkov tried to impress on me the psychology and working of a designer's mind.

"I want to tell you," he said, "that I never start drawing unless I see the thing. No matter what I am designing, I shut my eyes to see it first before I pick up my pencil or my drawing pen. When I use the expression 'to see a thing' I mean the drawing of it. With us professional designers," he explained, "the drawing is identified with the object itself."

For instance, if there is a breakage of any kind and Berezhkov is shown the faulty part and asked to give his opinion, he will always say, "Show me the drawing. I can't see a thing in the natural state." If he is asked, "Look at this member, is it done right?" he will answer, "Show me the drawing." The actual thing is not identified in his mind with the design. It does not conjure up an image of the design. But in looking at a design he can picture the thing itself, it becomes almost tangible, and he sees it as a thing that has weight, dimension, and form.

And so he came home with a ready-made drawing in his head. The thing now was to commit it to paper, make

a photo print of it, as it were, the way one does with a negative. He locked himself up in his room and sat there drawing till three o'clock in the morning, deaf to all invitations to come and have his supper and so upsetting poor Masha that she was now fully convinced that this new job would be the death of him. He always liked to give what he called a high drawing by the use of light and heavy lines. A drawing like that, he said, spoke and sang.

And although in recent years—the "troubled times" of Berezhkov's history, so to speak—he was seldom to be found bending over a drawing board, he now experienced a thrill of joy as, picking up his pencil, marking off the sheet, and tracing the first outlines, he became aware that his hand had lost none of its lightness and that the drawing sprang from under his pencil seemingly without any effort on his part. Of course, his recent work on the design of the turbine, which Shelest had rejected, must have had something to do with it. It had been practice of a sort.

By three o'clock in the morning Berezhkov's creation, now inked in, was complete in every detail. He had designed a very compact cylinder head with well arranged valves, which provided a neat and clever solution of the problem.

"Delightful! A beauty!" he exclaimed, admiring his drawing in the solitude of his room.

One remark here. Berezhkov, apparently, attached such great importance to this initial stage of his career that he spoke about it with peculiar relish, and, I should say, with a sort of theatrical gusto. Naturally, he missed no opportunity of playing to the gallery. I have tried my best to preserve the original flavour of his story.

The next morning Berezhkov set out for his office, where he was due at ten, with a roll of drawing paper under his arm. He described his emotions in the following words.

"Imagine a young artist taking his newly finished work to an exhibition to be submitted to the judgement of connoisseurs, who only recently rejected his previous thing.



Imagine how he feels—an artist who has not made a name for himself yet, has not won recognition, but is in love with his own work, although he has qualms about its being accepted. That was how I felt that morning."

He walked into the office with his drawing, sat down quietly at his desk and put the roll away in a drawer. A few minutes later Berezhkov was called over by his direct chief, engineer Nieland, a dour-looking man of about forty-five with a hard mouth.

"Make a drawing of this nut bolt," he said, handing him a pencil sketch. "It's dimensioned."

"For the AIS engine?" Berezhkov inquired.

"Yes."

Berezhkov examined the sketch critically.

"Who made this sketch?" he asked.

The chief was nettled.

"I did. Start work."

"I beg your pardon," Berezhkov murmured.

3

The junior draughtsman went back to his desk with the nut-bolt sketch—his first elementary task. He started work on it, and kept glancing at the door in anticipation of Shelest's arrival. At last he came in. Like the evening before, he nodded a general greeting and looked at Lukin. The latter smiled again shamefacedly, as though pleading guilty. A look of annoyance crossed Shelest's swarthy nervous face. He went over to his own desk, and sat in his armchair for several minutes without saying a word to anyone. At length he turned to Lukin.

"Let's have it!"

The tone was impatient, the gesture accompanying it an energetic one. They became engrossed again in the cylinder head. Berezhkov bided his time, then got out his rolled up creation, and went over to them with it. Shelest broke off the conversation.

"What do you want?" he said brusquely.

"Well, you see, Professor, an idea occurred to me yesterday evening—"

"It didn't occur to you, I suppose, that you might have waited until I was disengaged."

"Well, you see, it was about this cylinder head," Berezhkov answered. "But it can wait. I'm sorry."

With a polite bow he turned to go, but Shelest said quickly:

"What is it?"

Berezhkov paused before answering.

"I thought of a certain combination, one that might make possible a more convenient arrangement of the valve gear. When I got home, I dashed off a drawing of it."

"Where is it?"

"I have it here. But I'm not quite sure."

Berezhkov was not shamming modesty. He was really very nervous. What if Shelest, at first glance, detected some fault or serious error, which he, Berezhkov, had been too excited to notice.

With his heart in his mouth, Berezhkov smilingly unrolled the drawing.

"Oho!" Shelest ejaculated.

Flushing with pleasure he took the sheet of drawing paper in his hand. He was too good an expert in engines not to realize at a single glance that he held in his hand the solution which he had almost despaired of finding.

4

"What surprised me, I remember, was Lukin's attitude towards me," Berezhkov further related.

Berezhkov had been sure that he would make an enemy there. But he was mistaken. Lukin's eyes lighted up with genuine pleasure as he examined the drawing.

"Smart, very smart!" he said. "My congratulations. You have solved the problem."

Berezhkov did make some enemies, though.

On his third day at the office he contrived to fall out with engineer Nieland

Berezhkov described this man as follows. Engineer Nieland, a dour, ill-tempered man, who had taken his degree before the Revolution, and was preparing his dissertation, had every qualification for the work of scientific calculation. Now, a calculator is no mean figure in a drawing office. He is the antipode of the designer, a sort of official critic whose duty it is to question every design and every project, and to uncompromisingly reject any idea of the designer that fails to pass the acid test of analysis. Nieland was considered a peerless master of calculation, and all the ADVI designers acknowledged his authority. The trouble with him was that he refused to reconcile himself to his appointed lot as calculator, albeit head of a department, and was consumed by a secret and incurable passion, which inexorably impelled him to draw, design and construct machines, although nature had endowed him with no gifts in that direction.

The clash occurred over the unfortunate nut bolt which Berezhkov had been told to draw. He had been at great pains to make the bolt thread look dainty and had drawn a round light nut. The drawing, in the ordinary course of routine, found its way to Nieland's desk. The next morning, almost before he sat down, Berezhkov heard his chief's voice.

"Berezhkov, come here!"

Berezhkov's drawing lay on the chief's desk. Without saying a word Nieland picked up a red pencil and crossed out the work.

"Kindly do it again according to my sketch. And next time don't fantasize."

"But why? I tried to make the nut as light as possible."

"You need not have troubled. Why try to be clever when there are standard dimensions. Do it over again."

Nieland turned away, signifying that the interview was over. Berezhkov glanced at the free-hand drawing that lay next to his crossed-out design, and hazarded another remark.

"Won't that nut of yours be rather heavy?"

"Don't worry. Do what you've been told to do."

"But I can't help thinking—"

"What can't you help thinking, young man?" Nieland broke in on a rising note.

Here and there in the room heads turned round.

"I was thinking," Berezhtkov went on unperturbed, "that your nut bolt doesn't quite harmonize with the elegant lines that are characteristic of modern aircraft."

"I don't know what you call elegant. I don't use words like that."

"I daresay you don't. But if I may make so bold—"

Nieland's face went livid, and he sprang to his feet.

"None of your sarcasms, please!" he barked. "You haven't been invited here to teach me, young man."

Talk in the room was usually conducted in an undertone, and now all heads turned round at the shout. Nieland seized a bulky battered engineering directory that lay next to him and gave his desk a thump with it.

"The dimensions have come out of this book. Take it. Kindly check up. You'll find it's a standard nut bolt."

"That's just why it's no good," Berezhtkov answered. "In aircraft engineering other nuts are used."

"What? Maybe you'll show me them?"

"Certainly I'll show you in a minute."

Berezhtkov knew that next door to the aerodynamical laboratory there existed since Zhukovsky's days a small museum, or rather the embryo of a museum on the history of aviation. Among other exhibits it contained several aircraft engines of different makes. And although those engines were out of date they all had light nuts used on them—that Berezhtkov clearly remembered.

He went there, furtively unscrewed several nuts, hid them in his pocket and went back to the ADVI room. The nuts were laid on engineer Nieland's desk side by side with Berezhtkov's crossed-out drawing. That clinched the argument. Berezhtkov's drawing and the nuts from the different aircraft engines were identical in character. Two or three of the staff came up to have a look on one pretext or another. Nieland sat in sullen silence. From that day he conceived a dislike for Berezhtkov.

And so Berezhkov began his work career. Within a year he was no longer junior draughtsman but a full-fledged designer of the ADVI.

He couldn't remember all the jobs he managed to get through during that year. "I was just bursting with ideas!" he said. He had only to hear that the Institute had been given some new and serious problem to tackle—something that called for considerable time—for him to be offering his solution, his design, within three or four days. After the years so foolishly wasted, he threw himself eagerly upon his drawing board, creating—if only for the time being, on paper—aircraft engines, feeling at last that he had found himself, experiencing a surge of creative energy, which spouted from him as from a deep bored artesian well when it reaches the water-bearing stratum.

It sometimes happened that errors, miscalculations and wrong sectioning were discovered in the drawings which he brought to the Institute. He was often beaten in arguments, beaten by higher mathematics and references to researches of which he was ignorant. In order to fall in line with the other engineers and designers of ADVI, to keep up with them in learning, and, what was most important of all, to equip himself properly for the task of his life, Berezhkov was obliged to work very hard. He spent nights at home poring over the works of the classics in mechanics and heat engineering. He mastered foreign languages. He studied Shelest's book *The Internal Combustion Engine* until he knew it by heart and could quote from it offhand.

I already mentioned that Berezhkov never liked to complain about life's difficulties. It was not from him but from his friends, his sister, and his colleagues that I learned how hard he had had to work to make up for lost time when he started in ADVI, what a tremendous capacity for work he had, and how, after going without sleep for two or three nights running, he had always remained

his cheerful, jocular old self, had always kept his "working form."

In the course of a year he climbed the following rungs of the official ladder from junior draughtsman to designer draughtsman and then to junior designing engineer.

It was about that time that the Institute received an order to design a petrol aircraft engine for the Air Fleet.

Again it was Berezhkov who made the design. Made it on his own before any of his colleagues could tackle it. There wasn't an assignment of any importance handled during those years by the Institute or in which the Institute was indirectly involved, that did not arouse Berezhkov's interest. He was greedy for everything that was doing, anxious to be in the thick of things.

With Shelest's blessing, work was started on the construction of the Aurora aircraft petrol engine according to Berezhkov's designs.

The AIS engine was being built at the former Icarus Works, the Aurora at the Prometheus Works, which in those days was a rather primitive motor-car repair shop. Berezhkov went there every day, took the warm castings out of the moulding sand himself, stood over them while they were being machined, carried the finished parts off to the storeroom like trophies and saw them put away under lock and key, joked, swore, charmed, and kept driving, driving.

In describing all this Berezhkov groped for words which would make his listeners feel the eagerness and passion with which the designer looks forward to that thrilling moment when his design will have at last materialized, come to life in the shape of a machine such as the world had never yet known.

That moment had come. The engine had been built. And then the trouble started—failure after failure which drove the inventor and the works staff almost crazy. Berezhkov struggled for months over the development of the engine, but it baffled him. His Aurora, to which he had given the whole of his talent and passion, was one more failure added to the sad list of still-born engines.

Shelest's engine met the same fate. It was a long job getting it started, and when it did get started, the real trouble only began. The futile struggle lasted nearly a year, and then the engine was carried out and dumped in the factory shed like a corpse in a cemetery.

All other attempts ended the same way. There wasn't a designer or a works in the country that could give our aviation a production engine of Soviet make.

"But why?" I asked Berezhkov.

"Development!" was his reply. "There isn't an engineering works that doesn't know that word. This country had been building locomotives, locomobiles, ships and excellent guns for years, and every new construction required development. But we had never yet had experience in the development of aircraft engines. We didn't know what it was. We didn't know that ordinary grit in a designer was not enough, that he had to have bulldog tenacity and an iron will to see an aircraft engine through all its life-acquiring stages. It was this developing business that got us.

6

Ever greater efforts were being put into the creation of a home-produced aircraft engine. The work was carried on simultaneously in the drawing offices of several works and research institutes.

In 1925 ADVI received another commission from Air Force Headquarters to design a hundred horse-power engine. Extra funds for designing and staff increase were placed at the disposal of the Institute.

Work on the project lasted six months. By that time the Institute had received premises of its own—a small building on the outskirts of Moscow. Some dozen and a half machines were moved out there. It was winter. The place was undergoing repairs and decoration. The designers and draughtsmen were accommodated in a log cabin that stood in the middle of the ADVI grounds. It was known as "the hut." Twenty-five to thirty people were crowded into two small rooms. There was a draught

On the day the committee was meeting Bereshkov was very nervous. He had never been in that hall before. Prominent engineers and professors would be gathered there to discuss the project which Laif Liss's signature to it.

It was a warm sunny day in May 1942, and Bereshkov dressed accordingly in white trousers and a postach or green shirt with a broad bright tie. Over this he wore a navy blue jacket unbuttoned. They were selling flowers in the street and, prompted by a festive excited mood, he bought a small bouquet. Thus attired he presented himself before Shelist on the day of the meeting.

"My dear fellow," Shelist groaned, "you'll be the ruin of me."

"Why, what's the matter?"

Flushed and excited, Bereshkov was genuinely puzzled. Although he was not smiling, the corners of his fresh lips were turned upwards more noticeably than usual that day, bringing out that innate pattern of a smile of his.

"What are those flowers for? You're not going to meet your girl, are you? Take them out and leave them here."



Berezhkov dutifully complied. Then Shelest sniffed the air suspiciously.

"You've gone and scented yourself, too, I believe? No, I'm not going to take you."

"It was the barber, Professor. I'll wash my face if you like."

"Why, man alive, you don't seem to realize where we're going! Couldn't you put on some trousers to match that jacket?"

"I . . . er . . . I haven't got any to match," Berezhkov confessed. "The only other pair I have is brown."

"That's still worse. Really, I'll be on tenterhooks all the time you'll be sitting there."

"But why? I won't go off like a bomb, will I?"

"It's just what you will do. What if you suddenly take it into your head to come out and speak?"

"Why not? I'm prepared to defend our project."

"For God's sake don't. Leave that to me. You're sure to put your foot in it."

"I give you my word—"

"There'll be important people at the meeting, politicians. And you have such funny ideas sometimes. My dear boy, don't you see it will be better for our project if you keep your mouth shut?"

"All right," Berezhkov conceded meekly.

"Don't go blurting anything out for goodness' sake."

"I swear I won't say a word."

"All right. And please sit next to me there, I'll be."

Shelest looked him over with a doubtful eye, but made no further comment. Berezhkov earnestly repeated his promise.

And yet, three hours later, despite his resolution and the promise he had given, he popped up at that conference and . . . The chairman rapped his pencil on the water-jug, calling Berezhkov to order; Shelest tugged at his arm to make him sit down; Dmitry Rodionov, Chief of the Air Force, turned round towards him and looked at him closely, but Berezhkov, blind and deaf to the world, went on talking nineteen to the dozen.

This is how it happened.

The idea of the design was outlined at the meeting by Shelest in a brief speech. Every now and again he left the rostrum and went over to the drawings of the engine which had been hung up on the walls, wielding a black varnished pointer with smooth confident movements. His swarthy hook-nosed face—a face still youthfully taut and fresh—set off his grey eyes, which looked large and luminous. Cool and self-possessed, he made humorous remarks in the course of his speech, but one felt nevertheless that that distinguished Russian scientist and outstanding public figure was nervous for the fate of the engine which his Institute had designed.

After his report the discussion began.

The speakers were extremely vague, Berezhkov related. We listened anxiously to every speech and remark, although we knew that there wasn't a man there who could say of himself, "I have designed and developed my own aircraft engine." Many of those present were arm-chair scientists who had never designed or constructed a thing, and had never dreamt of applying their knowledge to practical things. They could only venture a guess that this was all right, and that wasn't. All of us who were engaged in the creation of the first Soviet aircraft engine were floating in a sea of doubt.

The extremely vague—as Berezhkov put it—opinions expressed at the meeting were for the most part favourable to the project. Sitting in the second row next to Shelest and other ADVI colleagues, and closely following the proceedings, Berezhkov kept glancing all the time at a man who was sitting in a wicker chair by the window, a little apart from everyone else, including the chairman, showing his profile to the hall. It was Dmitry Rodionov, the A. F. Chief, the very same Rodionov who, several years ago, when preparations were being made for the assault of Kronstadt, Berezhkov had often seen at close quarters with a rifle slung over his shoulder. Would Rodionov recognize him? Hardly. It was so long ago

Clad in a khaki summer tunic, Rodionov sat in a somewhat tensed, unrelaxed attitude, too erect for real comfort. His lean face with the rounded mole on the tip of his nose was covered with a reddish healthy tan, set off by a paler forehead showing the mark left by his cap. He spent much of his time at airfields, military exercises manoeuvres, and with flying squadrons scattered all over the country. He made no notes, and asked no questions, but sat listening attentively and looking closely at those who spoke. Berezkhov remembered him in the Budonovka helmet with the red star and the dark piping, and had never seen him bareheaded before. His hair came as a surprise to Berezkhov. It was dark, red-tinged, and he wore it parted in a perfectly straight line, brushed down hard and smooth on either side of the parting without a single hair out of place.

In those days Rodionov, like many others, was deeply concerned over the failure of the designing organizations and industry to supply the Air Force with a home-built aircraft engine. While admitting to himself that the root cause of these failures was by no means clear to him, Rodionov chose a course which he always followed on similar occasions, and that was to get to know people better, to listen to what they had to say.

After many speakers had had the floor, a man got up to speak whose name Berezkhov did not catch. He noticed, however, that Rodionov leaned forward slightly in his chair with a look of heightened interest. Berezkhov asked Shelest who the speaker was.

"Novitsky," Shelest whispered. "One of our chiefs. He finished a course of studies this year. Coming on fast. He's in charge of the Engine Section here, on this committee. He has a big say."

"Has he?"

"Rather. The last word, if you ask me."

"So he's the one who's keeping us stuck away in that hut?"

"In a manner of speaking, yes. He could push things on if he wanted, I suppose. But you have to be..."

"Have to be what?" Berezhkov asked curiously.  
"Be quiet, my dear. Let's hear what he has to say about us."

9

It was clear from the speaker's opening words that he was a very able and clever man. Having a full command of engine theory, as then taught, he had no difficulty in dealing with the few trivial objections and doubts that had been voiced at the meeting. A rather stocky, heavily built man with very bright brown eyes, he not infrequently during his speech turned towards Rodionov, as though he were reporting to him. Novitsky, on the whole, spoke favourably about the project. The fact that the design made no claim to originality was not, in his opinion, a drawback.

"To begin with," he said in his slow weighty manner, "we should least of all aim at what is new and untried."

In the same leisurely manner he ticked off what he considered to be the design's merits and its vulnerable points, then, summing up, declared that the idea was acceptable and its solution successful.

"Twaddle!" Berezhkov muttered.

He had conceived a sudden dislike for Novitsky. Shelest looked at him in surprise.

"Why? I think he's very sensible."

Novitsky's voice sounded distinctly in the hall.

"This is the first project of its type with us," he said, clearly formulating his ideas. "The work testifies to the improved standards in designing, which have been achieved under the guidance of one of our leading specialists, a man who is honestly cooperating with us."

Shelest acknowledged the doubtful compliment with a slightly ironical bow.

"We have our own young cadres," Novitsky resumed, addressing himself again to Rodionov, as it were, "whose lives are wholly bound up with the destinies of our Soviet Republic. I must say, though, that they are not yet in a position to give us projects of this kind."

Berezhkov stared down at the floor, frowning "And who are we?" he mentally protested with a sense of injury "We've been working on that design under beastly conditions," he thought, "and what has he done to help us? What has he done for the Soviet engine? What right has he to speak about us in that condescending way?"

He fired the questions off in silent indignation, barely suppressing an impulse to jump up and start heckling that sturdily built man who stood so firmly on his feet and enunciated his clipped phrases with such weighty deliberation

Novitsky, meanwhile, was rounding off and drawing conclusions The engine, he said, should be built, although it was merely a structure on standard lines achieved some years ago by foreign engineers

"This engine," he said, "will thus fall short of present world standards And what we need are engines that will come up to those standards"

"And beat them," Rodionov put in quietly

"Quite right, Comrade Rodionov We'll have our work cut out for us there And we must say clearly, without mincing words, that the absence of such engines is incompatible with the prospects of Air Force development, with the tasks of home defence."

It was an elementary indisputable axiom, but Berezhkov jumped up and shouted out

"And what about a hut—is that compatible with defence?"

Novitsky asked

"What hut?"

Shelest gripped Berezhkov's arm and tried to pull him down. But Berezhkov plunged on

"The hut in which thirty draughtsmen and designers have been cooped up all the winter! And house repairs, which are making practically no headway? And the machines, which haven't been unpacked all this time? Is that compatible with defence? We have one battered old *Hütte* reference book for the whole staff Did you do anything about it, Comrade Novitsky? Is that compatible with defence?"

The chairman interrupted him.

"Order, comrade!" he cried, tapping the water-jug with his pencil. "That's not to the point."

Rodionov's voice was heard saying:

"Why isn't it to the point?"

It grew quiet in the hall. Rodionov spoke from where he sat in a quiet indoor voice.

"Have you been working on this design?" he asked.

"I have."

"What is your name?"

Rodionov's eyes narrowed as he asked the question. He seemed to be recollecting something. Berezhtkov felt that he had been recognized and gave his name gladly.

The A. F. Chief smiled with his eyes alone, and said.

"Go on, Comrade Berezhtkov. Let's hear what the designer has to say. Well, well."

10

This impatient "Well, well" was a pet phrase of Rodionov's, by the way. It was with him not a mere meaningless expletive, but a living part of his speech, expressing all shades of meaning from kindly encouragement to anger.

Rodionov's tone, his entire pose, and the gleam in his eyes told Berezhtkov that he had not only recognized him, but was waiting with lively interest to hear what he would say. The trust and good-will that Berezhtkov read in those shrewd attentive eyes were stimulating. He suddenly felt perfectly at his ease in that hall; his flushed face resumed its natural colour, and the old Berezhtkov smile came out. He gave a detailed and colourful description of the "hut" in which the Institute had been housed throughout the winter, the red-hot little stove, the crackling desks. His narrative at times was greeted with laughter, in which he joined in.

"It isn't funny at all, though, comrades," he went on. "It's a shame! Comrade Rodionov will forgive me for saying so, but I think it's a disgrace to us, a disgrace to

the Air Force. Yet some agreeable things have been said here about improved standards in designing. Frankly, we designers of the ADVI are acutely aware of being shockingly starved and stunted."

For a fleeting second Berezhkov had a distinct glimpse, a sort of close-up shot, of Novitsky, lolling comfortably in one of the armchairs at the chairman's table and listening with a calm smile of lofty toleration. But Berezhkov was now fully conscious of his right to speak up loudly in that hall, and he said

"I am positive we shall be able to design wonderful constructions, beautiful engines, that will win first place in world competition. But we designers have got to be given a chance to show what we can do. We have no up-to-date testing stands, we lack many measuring instruments, and we still do not know, for example, what's going on inside a cylinder. Unfortunately, I have no say in the disposal of government funds."

There was laughter in the hall.

"But if I had, you may be sure I'd use them with imagination," Berezhkov rammed his point home.

Shelest regarded Berezhkov approvingly and not without surprise. He had often intended to speak up on behalf of the Institute as forcefully as Berezhkov was now doing, but had kept putting it off. Somehow he did not have it in him.

"It would be funny if it were not so sad, comrades," Berezhkov continued. "We can't have aircraft engines designed under such conditions in this country. And all the more inadmissible is it to call this improved standards."

Berezhkov sat down. Rodionov's voice was heard again.

"Is it true, Comrade Novitsky, that the Institute is in such a scandalous condition as we have just heard described?"

Novitsky heard the question out standing.

"Well, you see, Comrade Rodionov, the Institute is not our department."

"Well, well. What of it?"

Novitsky did not answer. Rodionov rose to wind up the proceedings. This was the second time in his life that Berezhkov had heard him speak in public. He spoke briefly, clearly and unhurriedly without raising his voice. One felt that what he said went.

"What of it?" he repeated. "We'll make it our department. If we of the Air Force don't take care of an Institute that is designing aircraft engines, then who will? We have acquainted ourselves with the project and to some extent with its designers. The discussion has shown that they know their business and are keen on their work. They also know how to stand up for themselves," he said with a glance in Berezhkov's direction. "We must help the Institute, supply it with the best and up-to-date instruments, provide the designers with all the literature they need, and tackle the house repairs in real earnest. We shall include these expenses in the A. F. estimates, and make a certain allowance in foreign currency, too. Take these matters in hand, Comrade Novitsky. Prepare the necessary documents for my signature."

This was a decision, made and announced on the spot by the A. F. Chief. With this his speech abruptly ended, and the meeting was closed.

The ADVI designers left the large building in Varvarka Street where the A. F. Headquarters were housed, flushed with victory. The street was bathed in the soft warm radiance of a late afternoon sun. Near the entrance stood a flower girl with a big basket. Berezhkov ran up to her and bought another buttonhole, then looked at Shelest with a defiant air.

"The answer to the maiden's prayer—that's the modern phrase, I believe?" Shelest said. "Go on, run along, charm all Moscow for all I care."

"How was my speech, Professor?"

"Terrific!" Shelest answered with a pleased smile. "In a word, à la Berezhkov."

"À la Berezhkov? Statesmanship, eh?"

Berezhkov laughed happily. He did not realize then how much truth there was in his humorous remark.



I give the further story of the ADVI-100 engine as Berezhkov described it to me.

The design was approved, he said. A sample engine was ordered from a motor works on the Dnieper, in the Ukraine, a former French-owned enterprise, which used to build Hispano engines. We forwarded the project, all seventy sheets of it, to the works with due solemnity.

But the works rejected our blueprints, declaring that it was impossible to build an engine from such designs. And they were in their rights. The system of preparing the shop drawings was still far from perfect at the Institute, and important details, such as limits of tolerance, and the order of assembling, were sometimes omitted. The drawings travelled back and forth from Moscow to the Ukraine, we visited the works, argued ourselves blue in the face, came back washed out and furious, made the detail drawings over again in accordance with the works' demands, and sent the sheets down again, but time passed and construction work was not even started. You wouldn't believe it, but a whole year was wasted in travelling back and forth and wrangling.

This constant fault-finding was simply maddening. For instance, the works people had never seen cylinders with air heads before, and they jibbed at the idea, said it couldn't be done. We argued, fretted, tried to put our foot down, but it was no use—they just wouldn't accept our drawings. We were all agog to see our creation in the metal, and there we were, instead, wasting month after month, arguing and squabbling.

"You can't imagine what torture that year was to us!" Berezhkov exclaimed.

One day, after these hostilities had been going on for some time, Shelest sent for Berezhkov. The Institute had already moved into the newly repaired two-storeyed building which contained the workshops, the research testing station, a large drawing room and the private office of the director, furnished in oak.

On Shelest's desk lay a bulky package, evidently containing books, and on top of it a blue addressed envelope.

"Sit down, Berezhkov," said Shelest. "You look thin. But never mind. You've finished redrawing those designs, thank goodness. And I still believe in your energy."

"These drawings are giving me nightmares, Professor."

"Never mind, I've made up a medicine for you."

"What's that?"

"A business trip. A journey to the Ukraine. I want you to go down to the works again."

"To start another offensive?"

"No. I want to suggest a different plan of operations this time." Shelest became grave. "It seems to me that we ourselves are largely to blame for having strained our relations with the works. This endless bickering has to stop. There are other ways of handling people. You're psychologist enough to understand what I mean."

The professor looked at him with a shrewd twinkling eye. Berezhkov gave a dignified nod.

"Go down there again," Shelest went on. "But be wise as the serpent. Use all your personal charm and fascination on one man there, and I'm sure you'll get things moving."

"Who's that?"

"The chief engineer."

"I've tried it," Berezhkov said with a sigh.

"Try again. Be more subtle. Take this with you."

Shelest unwrapped the package lying on his desk.

"There's a good deal here that should interest him," he said. "He's an experienced and talented engineer—a brilliant one in the past, I should say. If I'm not mistaken, he speaks three or four languages fluently. Look what you are going to give him."

Through the opened wrappings gleamed the gilt lettering of a French journal dealing specially with motor problems. It was a complete bound set. Shelest turned back the cover. On the flyleaf was written in his hand: "To my dear Vladimir Lubarsky, devoted knight-errant and champion of motors from a war-scarred old motor-

man whose modest labours are here murderously reviewed."

Berezhkov knew that review. In the last volume of his work Shelest had critically analyzed the views expressed by certain foreign specialists on questions of aircraft engine theory, which in some instances he had qualified as superficial, vague and often biased. He had been the first to deal at length with and substantiate the idea of motor rigidity. The French journal had responded with an acrimonious review written in a rather haughty tone.

"I hate parting with this relic," Shelest said. "What's more, I don't like making gaps in my library. I'll have to use the Institute's copy now. Show him these publications, too. They come from abroad," Shelest said, quickly turning over the pages. "Look at this French design of cylinder heads—they're a replica of those we have designed for our own model. The sight of them should melt his heart, and he'll do it for us."

"You can depend on me to make the most of this!"

Berezhkov gave play to his imagination, and already pictured his forthcoming interview.

"And here are cylinder heads of quite a different type," said Shelest.

Besides the books and journals there were also several foreign picture albums. Shelest opened one of them—representing French art of the late nineteenth century—and began carefully turning over the pages.

"He loves these things," Shelest said. "Let him feast his eyes on them and give himself a treat. I have no intention of giving them to him as a present, though. They're meant to win him over. A difficult mission, yours is, Alexei Nikolayevich, but then you're—"

"Say no more!" Berezhkov cried. "I'm off! I'll fascinate that devil or die in the attempt!"

The next Sunday found Berezhkov alighting from the train at station Zadneprovye in the vicinity of the works. He had specially timed his arrival on a Sunday so as to be

able to make a personal call on the engineer at his home knowing the latter to be a stickler for ceremony, however Berezhtkov did not dare to intrude without an invitation.

He was a long time turning the handle of the telephone at the railway station in an attempt to put his call through. The apparatus was an old Ericsson of pre-revolution manufacture housed in a clumsy wooden box fastened to the wall. These telephones were still in use in some provincial towns. The scratched chipped surface still bore traces of the old varnish and gave one an idea what the box looked like some twenty years ago when it had a high light-oak polish. There was a crackling noise in the receiver and a distant sound of voices, then suddenly these would disappear and all would go dead, as if the current had been shut off. Berezhtkov examined the receiver, discovered a loose screw with a worn thread, and was about to dive into his pocket for his penknife, but checked himself with a smile.

"This'll do the trick," he muttered, and simply pressed the screw down with his finger and began calling again. At last a voice broke through the crackling noises.

"Hullo."

Our hero all but warbled

"Is that Vladimir Georgiyevich?"

"Yes. Who's that speaking?"

"I've just come off the train. I have a letter for you from Moscow."

"Who from?"

Berezhtkov chose to evade the question at the moment. He slightly relaxed his pressure on the screw, and the receiver immediately went dead. After a while he pressed the screw down again and started calling.

"Hullo! Hullo! Vladimir Georgiyevich, is that you?"

"Yes. I can hardly hear you."

"A letter in a blue envelope!" Berezhtkov shouted. "And a book for you—autographed. May I bring them down?"

But the chief engineer, apparently, did not like to have his Sunday rest disturbed. He said drily:

"I'm sorry, but I have the doctor here just now. Will you please—"

Berezhkov chose not to hear the rest of the sentence. He relaxed his pressure on the screw once more. In a second or so he was shouting again

"Hullo! Hullo! A book for you autographed 'To the devoted knight-errant and champion'"

"What?"

"'Devoted knight-errant and champion.'"

"But who's it from?"

"It's rather awkward to shout it all over the railway station. May I come down?"

"But who are you?"

"What? What? I can't hear you"

"I asked, whom do I have the honour—"

"Oh, yes. I have your address"

"Whom do I have the honour—"

"What, your buggy? Don't trouble, I'll take a cab"

"Oh, all right. Come down"

Berezhkov hung up with a "Whew!" of relief

"Miracle of modern technique," he murmured, glancing gratefully at the old veteran of a telephone, and addressing a short humorous speech to the queue outside the call-box the while he got out his penknife and fixed the contact in the receiver by the simple expedient of shifting various screws from one place to another

He emerged from the station with a small suitcase and found himself on the market square. He loitered about for a while, strengthened his spiritual and physical powers right there in the sunshine with a solid portion of jellied meat and several thick pancakes which he washed down with a small pot of sour cream, then hired a rickety old cab, and sallied forth to the scene of coming battle, that is, to the house of engineer Lubarsky

The town stretched along the banks of the Dnieper. Soon the gleaming sheet of water came into view. It looked cool even from a distance, Berezhkov said to the cabman.

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"What? What? I can't hear you"

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The town stretched along the banks of the Dnieper. Soon the gleaming sheet of water came into view. It looked cool even from a distance. Berezhkov said to the cabman.

"Drive down to the water, old bean! We'll have a dip."

He ran down the footpath with his suitcase, and was soon tumbling about in the water, doing all kinds of tricks he remembered from the skylarking days of his boyhood. Then, while drying in the sun, he shaved at his suitcase, and changed into clean clothes—snow-white pressed trousers, white shoes, and a light "fantasia" shirt. A light summer jacket thrown over his arm completed the equipment. Berezhkov viewed his reflection in the mirror of the water with satisfaction.

"Now, old bean, don't raise a dust," he said, getting back into the cab.

The town was buried in the green of trees, front gardens and orchards. A little to one side, against a background of pale-blue sky, towered the black iron smoke-stack of the works. Although it was not smoking—it being a Sunday—Berezhkov's wandering glance was drawn in that direction as if by a magnet. It was at that works, where he had been so often with his drawings, that his creation was to see the light of day, was to be embodied in metal. It was there that they kept putting it off, demanding ever new drawings without end, worrying the life out of him.

The house of the chief engineer with its pretty gable roof and balconies, its little tower and slender aerial masts, stood in delightful grounds overlooking the Dnieper. Berezhkov paid the fare and dismissed the cabman, opened the wicket nervously, and stepped on to the garden walk, which was strewn with golden river sand. The thud of tennis balls came from somewhere behind the blossoming trees. Women's voices could be heard. Berezhkov went in the direction of these sounds. Presently, through the gaps in the foliage, he saw the players. The chief engineer was playing against two women. Sunburnt, a well-knit youthful figure, clad all in white, with rolled up sleeves and a wedge-shaped little beard in which two or three silver hairs glistened in the sunshine, Lubarsky ran lightly about the court, sending in low volleys with a hard stroke.

"You serve, doctor!" he called out.



A dark-complexioned woman, rather heavily built for that game, smiled back at him. "Aha," thought Berezhkov, "so that's the doctor you're so busy with!"

The doctor's partner was a girl, apparently the engineer's daughter. Berezhkov stood hidden behind the shrubbery, not daring to step out. He suddenly felt nervous. On his previous visits here with the drawings of the ADVI-100 he had been received by Lubarsky in his office. He had argued there, fretted, and demanded, but the chief engineer, with an imperturbable suavity that infuriated him still more, had always managed to send him away with a flea in his ear.

"He'll turn me out!" Berezhkov thought, watching Lubarsky and, despite himself, admiring his skillful strokes with the appreciative eye of an old sportsman. "Sure as eggs is eggs, he will! Well, there's nothing for it!"

Taking his courage into his hands, he stepped out from his place of concealment and said, "Good morning!" with a modest little bow.

The play stopped.

"Ah, it's you," Lubarsky drawled.

His tone was annihilating. It seemed to Berezhkov that the man had seen right through him at a single glance. He stood there with his suitcase, smiling rather sheepishly under the disconcerting glance of the host's narrowed eyes. The chief engineer was in no hurry to break the silence.

"Sit down," he said at length, pointing to a bench. "Wait a minute, please."

Then he turned to the women, exclaiming in quite a different tone.

"Victory in one minute! Go on, doctor. I'm ready."

Berezhkov sat down, and his eye wandered absent-mindedly to the doctor's bag lying on the bench and the lady's bicycle leaning against it.

And he was supposed to fascinate that man! Why should he demean himself, fawn on him? After all, he hadn't come here to beg favours! Damn it, hadn't the blighter been ordered to construct the ADVI-100 engine!

Then why was he trying to dodge it? And what did he mean, meeting the designer with that insulting narrow-eyed look, as if he were some crazy nuisance of an inventor! Berezhkov flushed at the memory of that cold offensive glance and his own idiotic grin. He looked resentfully at the engineer who was fluttering about the tennis court, showing no further interest in his visitor, as if he had forgotten his very existence. It was all he could do to keep himself from kicking up a row. Shelest's admonition, "Be wise as the serpent," had a sobering effect, however. Certainly it would be more judicious to avoid a row. "All right, I'll try my arts of fascination on the blightest! My name's not Berezhkov if I don't do it! But how? I've got to think of something quick, some staggering brain-wave!"

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Time, however, was running out, and no brain-wave had struck him yet. In the past a lover of all forms of sport, a speed demon on the motor-cycle, the motor car and the aeroleigh, Berezhkov had also been a passionate devotee of tennis. "Bad balls," he noted mechanically as he watched the game. One of the balls came rolling towards him. He jumped up quickly, caught the ball and threw it back. He noticed, as he did so, that it was soft and flabby to the touch. He resumed his seat and with an odd quickened interest looked at the doctor's bag, which was open. At the moment he did not realize himself why it suddenly attracted him.

"Do you understand chess?" Berezhkov unexpectedly asked me at this point. "You know what a combination is? You look at the figures without seeing it, but it's there on the board nevertheless—potentially of course. Then all of a sudden it begins to dawn on you—at first with only a faint glimmer, till it hits you with full force."

Sitting there on the garden bench looking at the doctor's bag, the bicycle, the tennis court, the swinging rackets and the heavily bouncing ball, Berezhkov had this

glimmer of an idea, and mechanically he began to work out all kinds of possible combinations

After winning the set, Lubarsky bowed to the ladies with a smile and walked towards the bench. The ladies came up too. Berezhkov got up hastily.

"So it was you?" Lubarsky said, repeating the previous phrase. "Come along then." Turning round, he added, "I must beg pardon of the ladies. Have a rest, please. I shan't be more than ten minutes."

He did not introduce Berezhkov. That could only mean that he was not receiving him as a guest.

"It's I who should beg pardon," Berezhkov said hastily. "I'm sorry to intrude like this. But I've just come off the train, straight from Moscow."

"Oh, really?" the engineer's daughter exclaimed. "I wish you'd brought us some new balls. I can't play with these. Half the pleasure is spoilt."

"Yes, awful trash they are," Lubarsky murmured. "I don't suppose you thought of it?"

He was regarding Berezhkov with the same cool, slightly ironical glance, which seemed to say, "Not smart enough for that, sir?" Berezhkov bridled, but at that very moment, the idea that had been lurking somewhere at the back of his mind suddenly leapt forth, vivid and clear like something that had risen out of dark submarine depths. His ears instantly began to tingle.

"Oh yes I did!" he blurted out.

The announcement was greeted with little cries of joy. "Let's have them! Where are they?"

"Here!"

Instantly transfigured, Berezhkov slapped the doctor's bag, then folded his arms on his chest and tossed his head up.

"Here!" he repeated mysteriously. "There's no need to go all the way to Moscow. In twenty minutes we'll be playing with excellent balls. I promise you that from now

on you'll always have wonderful tennis balls. May I have ?"

He started rolling up his sleeves, gazing at his audience in utter silence. He was absolutely sure of himself and of the idea that had just struck him, and bore himself with the assurance of a stage performer or a conjurer.

"May you have what?" the girl asked curiously.

"There are two syringes in that bag. May I use them?"

"What for?" Lubarsky said.

"I'll give these balls an injection of magic water!"

"Oh, Papa! Doctor! Let him have them! We'll see what he does. I beg your pardon—what is your name?"

Our hero introduced himself, then asked in turn:

"And what is yours?"

(The girl's name, I might add in passing, Berezhkov kept to himself. He had started, "Her eyes, when she looked at me . . ." and had tried to imitate a woman's admiring look with his own small eyes. But he caught himself. "Hush! Not a word of this in your story!")

"Next, please let me have the bicycle pump," he went on issuing orders, "and some rubber solution."

The next minute Berezhkov, with the calm assurance of a surgeon, had punctured the ball with a syringe filled with rubber solution. Next to that, at a distance of two or three millimetres, he plunged the other syringe, which was fitted to the tube of the pump.

"Will you kindly pump it up," he said, carefully balancing the edifice in both hands. "Some more! Just a little more!" The ball grew more resilient and hardened in his hand. "That'll do!"

He squeezed some of the glue out into the ball, then quickly pulled out both needles.

The public was disappointed. The hiss of air escaping from the punctures told its own story. The audience had the satisfaction of viewing a ruined and worthless ball. Berezhkov went hot and cold. What the—! Why hadn't the thing worked? Could it be that his idea was all wrong?

"That didn't work!" he declared with studied nonchalance. "That's as it should be according to the law of Aristotle."

"Of who?" the girl said

"Aristotle!" Berezhtkov said, nothing daunted. "And of the Russian naturalist and inventor of the aerosleigh Panteleimon Gusin. Attention please! With your permission, I take the next ball."

He repeated the operation on the second ball, his brain working feverishly to discover where he had gone wrong. Again he carefully injected the rubber solution. Carefully? Perhaps that was just the snag? Hadn't he perhaps been too careful? Let's inject more this time! That's it. Now out come the syringes!

The operated ball lay in his hand. He strained his ears to catch the tell-tale hiss of escaping air but there wasn't a sound. Designer Berezhtkov had put across his little miracle. The limp deflated old ball was rejuvenated, resilient. The rubber solution, under strong internal pressure, had stopped up the punctures, thus preventing the air from escaping.

"Here you are!" Berezhtkov said, bouncing the ball high in the air and catching it neatly. "Let's have all the other balls! All patent rights reserved."

"Do you mean to say it's your own idea?" Lubarsky cried.

"I swear I only just invented it."

"Here, let me have those."

He took the two syringes from Berezhtkov, turned them over in his hands with a look of interest, then took a ball from his daughter, held it in front of him and laughed.

"How simple! Amazingly simple!" he said, and plunged the needles into the ball one after another. Berezhtkov caught his smile, which oddly enough resembled his own innate boyish smile. All aquiver with excitement, Berezhtkov worked the pump furiously. Lubarsky performed the operation quite dexterously. From the sure neat-handed way he had of doing things, it was clear that he, too, was a constructor by nature. The rejuvenated ball bounced splendidly.

The chief engineer regarded his visitor with a kinder eye.

Berezhkov was in the seventh heaven.

He'd have something to tell his Institute colleagues back in Moscow! He'd tell them how he had got that unapproachable engineer with the forked little Mephistophelean beard eating out of his hand! Lubarsky, meanwhile, had inflated another ball, then a third, and a fourth.

'Are you fond of tennis, too?' he asked Berezhkov  
'Rather!'

Berezhkov forgot all about his lame leg and was ready to rush off to the court with a racket. In his present exhilarated mood he no doubt would have put up a pretty good show. But Lubarsky had already switched over to another subject.

"Where's that blue envelope of yours? You did intrigue me over the 'phone. I must say. Invented quite a story."

"Oh, no, I don't go in for that kind of invention! I have a letter for you from Professor Stieglitz and a set of French journals with his autograph. To the devoted knight errant and champion of motors—"

"Oh, of motors!" Lubarsky exclaimed, and burst out laughing. "What journal is it? For what year?"

On being told, he said eagerly

"That's new for me. I'll look through it with pleasure. Thanks. Will you please come into my study?"

"No!" his daughter intervened. "I'm the hostess here, and I invite our guest to tea."

Our guest! What more could Berezhkov want? "Hurrah, victory!" he kept repeating to himself, as if sending out joyous radio signals to his colleagues in Moscow.

Presently he was sitting at tea on the verandah, holding forth to the ladies about the amenities of life in the metropolis.

After tea Lubarsky said amiably:

"And now come into my room."

The vast study of the chief engineer upstairs had a

large bay window, occupying almost the whole length of one of the walls. It commanded a sweeping view of the glittering expanse of river, cut off here and there by bends in the bank, and reappearing unexpectedly with a gleam under the blazing sun. The rolling steppe lay spread out in strips of brilliant green, pale yellow and russet shades. The horizon was veiled, steppe and sky seemed merged in a light haze.

"Wonderfull" Berezhkov exclaimed, admiring the scene. "What a wonderful view!"

"Do you like it?" Lubarsky said. "I was my own architect here. I rebuilt the house and put in this bay window myself."

"Delightfull"

Berezhkov looked out through the sides of the bay window to left and right.

"I don't see the works," he said.

"It's behind the house. You can't see it from here. This window gives only a scenic view."

On a special lacquered stand by the window stood a radio-set—a novelty at that time—and next to it two wicker armchairs and a rocking-chair.

"I like to sit here and relax," Lubarsky said. "Listen to the music and look out of the window."

He paused, then quietly recited some lines.

"'Russia, beggared Russia! Thy dingy *izbas*, thy wind-blown songs are like the first tears of love to me. 'Remember it?'"

Our hero, to his shame, did not know the lines. Nor did he see any dingy *izbas* through the window. Far across the river he saw a village with pretty whitewashed Ukrainian huts. The pathetic lines about a beggared Russia left him quite unmoved. Nevertheless he hastened to nod agreement.

"Sit down. Make yourself comfortable," Lubarsky said, motioning to an armchair and the sofa.

The study contained, among other things, a drawing board and a plain deal work table, on which Berezhkov saw various tools, a vice, and a tiny disassembled motor.

He tried to keep his eyes away from it so as not to appear inquisitive.

"Your workshop, I see?" he said tactfully

"Yes. Have a look at this thing"

They went up to the table.

"Ah, you have something very interesting here," said Berezhkov

"A motor of my own design—one tenth horse-power"

"Such a small one—what's it for?"

"I intend to fly an airplane model in a day or two with a curious passenger"

"A passenger, on such a tiny motor?"

"Yes. Look at that."

Lubarsky got out a large photograph and handed it to his guest. It showed a box kite hovering in the sky with a basket attached to it.

"Take this magnifying glass. D'you see the nose of a little dog peeping out of it? We'll have him here in a minute."

Turning to the open window, Lubarsky put two fingers into his mouth and gave a piercing whistle. The boyish gesture delighted Berezhkov. He recognized in his host a kindred spirit. But the dog did not answer the call.

"Must have gone out with the kids," Lubarsky said. "Never mind, we'll give him another whistle later on."

Berezhkov liked that, too. The idea of a trained dog being allowed to run about at his own will appealed to him. He was already feeling quite at home in this house, and had no doubts that when the critical moment arrived he would rise brilliantly to the occasion and achieve his purpose.

Meanwhile he stood over the tiny motor, examining its construction.

"Splendid ideal! I once constructed something like it myself, but on a different principle."

He got out his pencil, asked for a sheet of paper, and dashed off the scheme. Lubarsky watched him with interest.

"And did it work?" he asked



"On and off, a few minutes at a time. Kept breaking down. I finally gave it up."

"Gave it up. The same old story. The theme for an endless romance about Russia."

"No. I'd like the hero to go through with it. Some book that would be!"

The answer amused Lubarsky.

"Your design ideas are much more original," he said, dropping the philosophical strain and picking up the sketch again. "What would you say if I tried to make a small motor on your principle?"

"Welcome. Share fifty-fifty," Berezhkov said jokingly. "Both the money and the fame."

Lubarsky laughed again.

"Money, fame? Where are you living? I make these little toys with my own hands just for the fun of the thing."

"Yes, but afterwards you could put this motor into serial production, and turn it out in batches for aviation model enthusiasts."

"You don't mean that seriously, do you? My dear fellow, where will you find a factory in this country capable of turning out such finely tooled things as this? I ground every part of it with my own hands."

A drawing of the motor lay right there on the table. The two specialists began talking shop. Berezhkov once more expressed his admiration of the subtle way in which certain designing problems had been handled, then said:

"Do you mind if I do some criticism?"

Lubarsky smiled acquiescence.

"Don't you think that this group here"—Berezhkov's pencil drew an imaginary circle round certain parts of the drawing—"could be improved? Isn't it rather heavy for this thing?"

The chief engineer had stopped smiling. Yes, Berezhkov had put his finger on it. It was the only part in the whole construction that did not satisfy its inventor. After using up reams of drawing paper he had finally given it up and reconciled himself to a variant which he himself thought rather crude.

"What if you gave her more play here," Berezhkov continued, swiftly making some correction on the drawing, and glancing apprehensively at Lubarsky to see how he took it. But Lubarsky said

"I see. Go on, develop your idea."

Berezhkov illustrated his idea with a few swift strokes of the pencil on a clean sheet of paper.

"You see the whole of this group will then—"

"Quite right!" Lubarsky exclaimed.

He had so often groped around this idea in his quest that it now seemed to him to be his own.

"Quite right! I've been thinking of that myself! But how did you hit on it?"

Berezhkov flushed. He was sensitive to praise.

"A precocious child," he said with characteristic Berezhkovian modesty, spreading his hands.

"Precocious, eh?" Lubarsky repeated, smiling. "Come on, innocent babe, let me have that letter."

The precious suitcase was opened forthwith. Berezhkov handed Lubarsky the letter and stacked the books and journals neatly on the small occasional table next to the sofa with the gold lettering of the French journal uppermost.

"Ah, how well they do these things!" Lubarsky said, an unmistakable note of admiration in his voice. He ran his finger-tips over the binding which cleverly imitated leather, then read the letter, fingered the cover again, turned it over and read the inscription with a smile.

"'Devoted knight-errant.' It's a pity I haven't had anything of mine in print for a long time, otherwise I'd have answered back, 'To my dear sly fox Shelest.' I wouldn't mind spending an evening with him, philosophizing. An article criticizing his book, eh? Interesting."

"I'll find it for you."

Berezhkov pulled the heavy volume towards him with exactly the effect that Shelest had foretold. Under the journals lay the art albums, and Lubarsky saw them.

"What's that? French reproductions?" He fairly pounced on them, and settled himself more comfortably in his chair. "Where did you get them?"

"They're Shelest's I asked him to let me have them to glance through in the train."

"My God! To glance through! In the train!" Lubarsky ejaculated as he carefully turned over the large rough sheets with the reproductions pasted to them under the finest of tissue-paper. "Just look at those colours! In the train! Barbarian! Why, this is something you can feast your eyes on without ever having your fill! They're artistic revelations, things of exquisite beauty, the poem of our age."

"Our age?"

"D'you mean to say they leave you cold? Look at this! A lonely drunkard with an empty glass before him. Look at his face, look at that dangling arm—it tells a story in itself, it." Lubarsky paused without tearing his eyes away from the sheet. "No, words cannot describe it! What gloom! What hopeless misery! Just that empty glass! What a ghastly tale of life."

He fell silent again. Obviously, the pictures moved him deeply. He opened another album, and turned up an excellent reproduction of Van Gogh's "Prison Court" showing a straggling line of prisoners slouching round a cage-like prison yard on their daily walk.

"And this piece, can you ever forget it!" Lubarsky exclaimed.

Always restrained and coldly polite in official surroundings, he was quite a different man in his own set (which consisted mainly of engineers), where he enjoyed nothing so much as a friendly conversation. Bereszhkov, for his part, listened attentively to the chief engineer's outpourings, which, to him, meant another sign of recognition.

"Just look at those tones," Lubarsky was saying. "What a depth of despair they express! Pale blue and lilac tones. Eternal twilight. The sun never shines here. And there is no escape from these walls. Just walking round and round in a circle. What for, why? Seek no answer. Or rather the artist has supplied the answer: our life is a prison."

He drew a sigh and went on

"A prison—Desolate meaningless. None of our painters have been able to express the tragedy of existence with such power."

Berezhkov bided his time, waiting for an opening to introduce the subject of the ADVI 100 engine and air-cooled cylinder heads. All braced for the plunge, he tried to show polite interest although he could not help feeling that there was something comical about this lean, sportsman-like sun-tanned engineer dressed with such careless elegance, and lounging comfortably on the sofa—a man who had a whole industrial plant at his disposal, who had reconstructed this room—his study-workshop where he amused himself building toy motors—it did seem rather comical that this man should be moaning about "life being a prison." For the sake of courtesy and intellectual contact, Berezhkov tried to attune himself to his host's melancholy mood, to heave sorrowful sighs and to show what a refined nature his was, but he just couldn't keep it up.

"Prison, my grandmother!" he thought.

Even that moment, while the chief engineer was feasting his eyes on the pictures and holding forth about Van Gogh's painting with almost poetic fervour, and Berezhkov sat listening to him with an innocent look of rapt attention—even that moment, Berezhkov felt, was thrilling, pregnant with promise, surcharged with electricity. "Life a prison." What nonsense! What about this fight for his engine—wasn't that real life? Talk about colours and passions!

Eternal twilight. . . What an ideal Berezhkov looked at the vivid sun-drenched world outside the window. The thinning afternoon sun, still bright and hot, threw everything into sharp relief. The stream of the Dnieper and the sands no longer merged into a single gleaming sheet. In the distance sky and earth parted, and the sky itself was no longer faded looking, but intensely blue. The clouds, too, dazzling white and scattered, seemed to have acquired form and bulk. The leaves of the poplars flut-

tered in the breeze, and one could see the dappled play of light and shadow in the foliage. Yes, this was life, palpitant life

Berezhkov could hardly keep himself from starting an argument. There had been a time once, when, sadly dipping his brush in the cherished tin of enamel paint and coating the old trough in the kitchen, he had buried his dreams and given himself over to thoughts similar to those Lubarsky was now expressing. But, damn it all, this second life that he was living was not bad at all! Hadn't he found new dreams, a new faith, new fields of aspiration? Heigh-ho, señor Lubarsky, you've simply failed to walk into your second life, from what I can see of it. You're still crying over your first.

Berezhkov wisely held his peace, however. "Keep quiet, you'll only put your foot in it!" he warned himself. But he was expected to say something. At any moment Lubarsky would look up questioningly, seeking understanding, while he was still groping for some pertinent remark in sympathy with his host's mood. This would never do! He must get off this dangerous ground somehow or other. Enough of these painters! Didn't he have another trick up his sleeve, his last but irresistible master stroke! Come on! It's the engine's turn now. "Sorry, gentlemen," Berezhkov mentally bowed the painters out, "see you some other time." He cautiously moved up the set of French journals, furtively made sure the red silk marker was in its place, and waited for an opening.

Lubarsky, however, had noticed Berezhkov's movement. He laid his hand on the open album, saying, "No, no, don't touch them," then shifted his gaze back to the Van Gogh. "Prison, a prison," he murmured. "File of prisoners. I stood for hours once in front of that picture. My dear fellow, it was me, it was us, the painter described. Say what you like, but I think it's a masterpiece, eh?"

He leaned back and looked up at last at Berezhkov.

Berezhkov seized this opportunity to hold the set of journals out to him.

"And this? What would you say of these masterpieces?" he said, opening the volume at the marker and laying it adroitly on top of the album on Lubarsky's knees.

"Barbarian!" Lubarsky cried. "You'll crush it!"

Berezhkov hastened to salvage the album from under the heavy book, and Lubarsky was not easy in his mind until the coloured print of the famous picture was covered up with the tissue-paper and safely deposited on the little table. During those few minutes of suspense, Berezhkov, to use his own expression, was on the rack. At last the chief engineer was again sitting back comfortably in his armchair, giving his attention to this new work presented to him.

After glancing at the calculations accompanying the drawings, he made some shrewd remarks.

"Notice how neatly the oil-feed line has been handled there," Lubarsky said. "Purely French lightness. On the whole, though, nothing out of the ordinary. Just an efficient piece of work. But where's the revelation, the magic we usually associate with genius?"

Berezhkov heartily agreed. His opinion of this novelty coincided fully with that of Lubarsky. If he had let himself go, as often happened during the heated disputes at the ADVI, he'd have torn the thing to pieces. Just a mediocre little French engine. The ordinary average level attained by European engineering. That oil-feed line was pretty good, though. It was pleasant that Lubarsky had such a true and keen feeling for the aesthetic in machines. Berezhkov paid him a delicate compliment.

"The aesthetics of the machine!" Lubarsky repeated with pleasure. "Have you ever been in France? Aesthetics with the French runs in the blood. Everything there is graceful. There's a country for you where life is all enchantment."

Berezhkov jerked him back to earth again.

"And what about the cylinder heads? I'd call them anything but aesthetic, wouldn't you?"

"What heads? Ah, the cylinder heads," Lubarsky said, coming back to the journal. "No, why? I think the heads are faultless, if anything."

It was just what Berezhkov was waiting for. In a twinkling he laid a small photograph of the ADVI-100 in longitudinal section alongside the design in the journal. Lubarsky couldn't quite make out whether this smooth glossy card had come out of his guest's pocket, out of his sleeve, or straight out of the air.

"Well, don't you see," Berezhkov began in a tone that was at once triumphant and pleading, "in our design the head is exactly the same type."

The two drawings lay there side by side. What objection could the chief engineer now raise? At last he was pinned down, disarmed.

Lubarsky picked up the photograph and held it out at arm's length. After an hour and a half spent in easy friendly conversation with Berezhkov, to whom he had taken a definite liking, the work he had hitherto so persistently rejected in the capacity of the works' chief engineer appeared to him in a new light.

"Is this your design?"

"Yes, I've had a hand in it," Berezhkov modestly confessed.

"Not bad. Nothing out of the ordinary, either, but still, it's neatly done. The general outline is flawless. Feminine, I should call it. I always aim at that kind of outline myself, and frankly, I envy you. The thing's really quite as good as the Hispano."

"Then why don't you make it?"

"I would, with pleasure! But where?"

"At your works, of course."

"Here?"

With a weary gesture Lubarsky pointed back over his shoulder towards the works, which could not be seen through the great window. His sunburnt face with its pointed little beard grimaced.

"Do you seriously believe we can build your engine?" Lubarsky said.

"But why not? You said yourself it was nothing out of the ordinary. If the French can—"

"Goodness me, you are a babe! Surely men like you and me should realize that it's impossible for us in this God forsaken hole to build engines that are now being made abroad. You're a very likeable chap, Berezhkov, but that doesn't mean we can build your engine."

Lubarsky's eyelids drooped wearily. They were crinkled like old paper. It was perhaps the only thing that betrayed the age of this urbane, aristocratic engineer who still played his dally game of tennis. At the moment he looked an old man.

Berezhkov glared at those eyelids with hatred. At that moment, beneath the brilliant veneer of talent, artistic temperament and education, he glimpsed the dead tissues, the burnt-out black cinders of the man's soul. So that was why his lordship, the marquis of Zadneprovye, had been holding forth about dead-end futility, about desolation, and prison. He was at a dead-end himself, and lived in a world of gloom. Were there any words that could touch his feelings? No, it was useless. Berezhkov had said all there was to say, had exhausted all the nervous energy he was so richly endowed with, had brought into play all his resources right down to the last irresistible master stroke, and all he got for his pains was that vacant stare, those bored drooping eyelids. No, they'd never build the engine here, not so long as this apathetic frightful man remained chief engineer.

Berezhkov glanced at the open album, which had been so carefully deposited on the little table. Van Gogh's bleak picture of the wretched prisoners taking their walk in the prison yard showed through the transparent paper. In a sudden fit of fury Berezhkov leapt to his feet and ripped off the thin covering.

"To prison!" he shouted. "To prison!"



He banged the album with his fist with an utter lack of reverence for art. Lubarsky sat up, dumbfounded. His face grew at once cold and haughty.

"What do you mean?"

"What I say!" Berezhkov controlled his temper and said slowly and distinctly with outward calm. "That's the place for you! There's where you belong!"

"Kindly leave this house. If you want to rave you can do it outside!"

"Very well! We'll build our engine all the same, and as for you. I'll have you bottled up here, I will!"

He smashed his fist down again on the reproduction, turned on his heel and strode out of the room, leaving the albums behind.

19

Berezhkov slammed Lubarsky's door and went off to a hotel, where he took a room. He decided to go to bed early. Sleep was his sovereign remedy for all life's ills, the best cure for a bruised spirit. What a day it had been! The thought of Lubarsky made him want to swear. The cold-blooded murderer! The butcher! Thought he could kill our creation, did he? No bloody fear! Berezhkov would have a good sleep, and in the morning, charged with fresh energy, he'd think of some way of saving his engine. He had plenty of fight left in him yet!

But he tossed about in bed unable to fall asleep. How was a fellow to get any sleep with that blasted Lubarsky standing before his eyes. There he was, racket in hand, eyes narrowed, drawling coldly, "Ah, it's you!" Or lounging on the sofa, looking bored, and saying, "Men like you and me should realize. . . You and me. The rotten blighter! Imagination came quickly to his aid. He saw Lubarsky being led down into a ravine. The sentence is read out, "Found guilty of hamstringing creative thought. . . Hamstringing the plant he was in charge of. . . A disgrace to his profession. Sentenced to be shot!" And Berezhkov levels his revolver, pulls the trigger without flinching.

That was all very well, but what about getting some sleep?

He threw back the blanket, went over to the open window and inhaled the scent of the acacias. How quiet it was! All the windows dark, the little town fast asleep. In the pale moonlight he made out the iron smoke-pipe of the works straining up towards the pale stars. Not much of a factory, that. It didn't even have a brick smokestack. But what a lot one could do even there. The old yearning seized him again. His thoughts went back to the workshops at the School of Engineering—the turning and machine shop, the foundry, and the forge. How wonderful they had seemed to him when he first entered them. He had thrown up his studies in the institute, lost his head completely, like a young man in love, and spent days there constructing his first engine—the outboard motor. He thought of the Ludinovsk Works—a big up-to-date plant where heavy engines—locomobiles—were built. How happy he had been, taking a course of practical studies there as a student! Even now, as he stood before the open window with the blooming acacia bushes below, he could almost smell the peculiar odours of the works—the whiff of molten cast-iron poured into black sand moulds, which, too, had a smell of their own, the exhalations of the soap emulsion used as a cutting lubricant, and the very smell of the fresh steel shavings at the lathes.

Impossible to cast cylinder heads! Nonsense! Where there was a will there was a way. Besides, it was so devilishly interesting! He recalled the weary scornful gesture with which Lubarsky had poked his thumb back towards the factory, somewhere behind the blank wall of his study with its great bay window. He had purposely had that window made there, the sybarite. Shooting was too good for him!

It was stuffy. No, he wouldn't get any sleep. Hardly realizing what he was doing, Berezhkov dressed and went out. He mooned about like a somnambulist, but it wasn't the moon that lured him, it was the factory chimney.

Berezhkov plodded through the deserted streets of the sleeping town. His footfalls were the only sound that broke the silence, but suddenly he became aware of another sound, something like the far-off rhythmic hum of a motor, or the murmur of a waterfall. Ah, it was the Dnieper swirling amid the rapids. What a long way the sound carried in the dead of night!

Would that wretched ADVI-100 ever start humming? Would Berezhkov ever touch its rough metal body, feel the pulsation and the warmth of it?

A sound of singing came from somewhere ahead of him. What could that be? There wasn't a house in sight. Berezhkov was walking alongside the factory fence, and behind it everything was in utter darkness. A young high-pitched voice was singing

*Volga, Volga, mother river,  
Dear to every Russian heart.*

There was nothing remarkable in the fact that someone was singing about the Volga in a Dnieper town, except that the song was sung in a rather unconventional way, in a too retarded rhythm. Berezhkov stood listening. Several other young voices joined in. Where could it be coming from? It sounded from somewhere behind the fence, maybe from round the corner farther down. A gay party? Didn't look like it. There was no yelling, no whistling, no sounds of tipsy revelry. When "Stepan Razin" came to an end, another song was started.

*Underneath a blazing sky  
Through the steppelands parched.*

The same voices joined in again. And once more the tempo was somewhat retarded.

*Rifles cocked and banners high,  
Budyonny's horsemen marched*

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On reaching the corner, Berezhkov saw shafts of electric light streaming from two open windows of the works' main office. Several men were standing at sloping desks in a large room, drawing and singing. The song leader was a tow-haired lad of about seventeen with a Y.C.L. badge on his shirt. He was working busily. Before drawing a line he would first try his pen on a scrap of paper, and sometimes on his own arm. His left forearm was spotted with ink from wrist to elbow. Next to him was a young engineer in a faded blue duck jacket, whom Berezhkov had already met at the works. Now what was his name? Something like Nikiforov. Or was it Nikitin? He was in charge of the design office here. During his previous visits Berezhkov had hardly taken any notice of him. They had not been designing any engines here, the post of chief designer was considered superfluous, and the so-called design office, as far as Berezhkov could see, was really nothing more than a drawing room which had little, if any, say in production affairs. No doubt that was why they had put such a young newly-fledged engineer in charge.

I wonder what he's at, that Nikiforov, or Nikitin, or whatever his name is, thought Berezhkov. The scene that presented itself to his gaze in the frame of the brilliantly lighted window was somehow oddly familiar. It conjured up a vision of the "hut," where, months ago, Shelest's fosterlings had worked night after night—minus the singing—making the detail drawings of the ADVI-100, eager to get the design finished as quickly as possible.

Standing in the dark, Berezhkov ran his eye over the walls of the room. And there, sure enough, hung a large sheet of drawing paper in a wooden frame with a general view of some motor or other depicted on it. Neat letters formed the heading: "Zadneprovye-100." Berezhkov whistled softly. Oho, so they were designing an engine of their own. And a hundred horse-power one, too. Narrowing his eyes he made out a line of smaller type. "Design of Engineer P. Nikitin." So that was the real leader here! Come to think of it, he had an interesting face. Rather

high in the cheek-bones. Slightly aquiline nose Ears sticking out stubbornly And fair curly hair

The men at the desks were singing harmoniously in a chorus:

*Nobody can take away  
Our hard-won victory!*

"May I come in?" Berezhkov shouted.

He had come up to the window-sill and was now standing in the light. Everybody in the room looked round.

"Ah, Comrade Berezhkov!" said Nikitin. "Come in. But wait a minute, we'll show you in. Pavell" (The tow-haired song leader jumped up) "Or maybe you'll climb in through the window, Comrade Berezhkov?"

"I don't know. I'm afraid I've lost the use of my legs."

"How's that?"

"I was walking past, and was just staggered to see."

"Our engine?"

"I haven't seen it properly yet."

"Then have a look. It's interesting to have your opinion."

Nikitin came up and held his hand out. Berezhkov gripped it and swung himself up on the window-sill, then dropped into the room.

21

When Berezhkov stepped in front of the large framed drawing on the wall, Nikitin's jaw muscles began to work and a flush tinged his swarthy face.

Berezhkov examined the drawing of the engine in silence. His first impulse, on scanning it, was to exclaim, "What a monstrosity!" but he checked himself in time. How d'you like that! Trying to compete with us, eh? I wish Shelest could see it. Talk about crude! Hullo, look what Nikitin has gone and done with the dynamo! It didn't fit in with the over-all dimensions of the engine, so the best thing the designer could think of—some designer,

I tell you!—was to leave it outside the contour line. There it was—just look how it sticks out!

All the men in the room were hanging on Berezhkov's lips.

"We've put you on your mettle, I see," he said at length.

"May we ask you a favour, Comrade Berezhkov?"

"Certainly."

"Tell us straight what you think."

"What can I tell you? Frankly, there is so much here that still needs thinking out, and working out, that . . . And the visitor from Moscow, with an involuntary smile of superiority, began to analyze the design. "Well, to begin with," he said, "why couldn't you round out those angles give them a smoother natural curve to reduce head resistance?"

Nikitin now looked calm. The muscles of his jaws no longer worked, and his swarthy face resumed its normal colour.

"Natural? I'm not so sure about that. Those angles give me rigidity. I gain in volume what I lose in head resistance. These values are determinable. And the ratio is in my favour."

He took a pencil from his desk, pulled a slide rule out of its case and started scribbling figures on the wall. A long chain of equations quickly appeared on the white plaster. Berezhkov smiled. It was rather amusing to have rigidity explained to him, a pupil and member of the staff of Professor Shelest. But this fellow Nikitin knew what's what, it seemed. His arguments were original, too. Had he come upon those formulas himself? Berezhkov was now following him with interest.

"Excuse me," he said, "but you have arrived at a different power factor than that given in Shelest's book."

"Have I? Please give us the coordinates of that Bible then."

"The coordinates? Bible?"

"Yes. What volume, chapter, page. We'll get it down and check it."

"What, check Shelest?"

"Why not, is he infallible?"



Nikitin finished his calculations and handed Berezhkov the pencil.

"Prove I'm wrong!"

"He's floored!" the tow-haired lad chipped in.

"Shut up, Pavel!"

This was uttered sternly, but, glancing in Pavel's direction, Nikitin could not resist a wink. Berezhkov, in fact, could detect no error in this curious and intricate calculation. He looked at the drawing again. H'm. There was method in that angularity, to be sure. But as a whole the thing was clumsy. His fingers just itched to correct it.

"I'm afraid," he said, still with the same superior smile, "that I'll be out of my depth here. You see, I'm in the habit of thinking in terms of designs and not formulas. I argue with drawings. Do you recognize that mode of discussion?"

"Let's assume that I do."

Berezhkov was about to take the pencil, but suddenly changed his mind. He pulled the photograph of the main section of the ADVI-100 engine out of his breast-pocket—the same photograph which he had set before Lubarsky that day.

"May I pin this up?"

"Certainly."

Nikitin helped him to pin the photograph to the slat above the sheet of drawing paper before which they were standing. Berezhkov stepped back. Really, what was there to argue about! The two designs spoke for themselves. He even drew a sigh of satisfaction. No doubt about it, the design of the ADVI-100 was a happy one. How elegant it looked beside that—yes, it *was* a monstrosity!

"Just look at those two, Comrade Nikitin. And tell me in all sincerity—Isn't it perfectly clear which of them is the best?"

"Sure. Ours."

"You think so?" For a moment Berezhkov was taken aback. "All right, let's compare them. That chief engineer of yours, Monsieur Lubarsky, damn him, has been leading us a dance this last year, but even he admitted today that the configuration of the ADVI-100 was faultless.

Faultlessly feminine, he called it. Look at it. You meet with lines like that in Nature—the world's greatest designer."

"But Nature also created man," Nikitin broke in, "a creature built on far more angular and rigid lines."

Nikitin developed his ideas, Berezhkov caught himself following this gamecock of an engineer with heightened interest.

"There's something in that," he said grudgingly. "But you've done it so crudely—"

"By what criterion do you judge that?"

"A designer has an eye for that sort of thing, a flair, you know."

"God's gift, eh?"

"Frankly speaking, I accept that expression although I don't believe in God. Do you reject it?"

"I question it."

All of a sudden Pavel began singing—

*Underneath a blazing sky  
Through the steppelands parched.*

He went off at a rollicking tempo, beating time with an ink-stained hand and jumping up and down on his stool. Beads of sweat gleamed over his fair eyebrows. It was a song of victory. Nikitin had defended the Zadneprovye-100, had held his own against that squirt of a Moscow designer. All the others sitting at the drawing desks joined in the psalm. Nikitin commanded silence with a gesture of his hand, but there was a smile on his face when he turned to his comrades, although he bit his lip to suppress it.

"You question everything in the world, from what I can see," Berezhkov said.

"I do. The only thing I'm dead sure of is that." Nikitin threw his head up and pointed to a strip of faded red bunting tacked to the wall. It was a May Day placard with a slogan done in whitewash, which had now dried and cracked in places. It read "Long Live the Victory of Communism the World Over!"

Berezhkov sat down on a stool. How old was that mathematician of an engineer, who accepted nothing on faith? Probably not twenty-five yet. Obviously he was not one to waste his time and let life slip past. He wouldn't lose any chance, not he.

22

"What Institute did you study at?" Berezhkov asked.

"The Moscow School of Engineering."

"Oh, so did I! Whose lectures on aircraft engines did you attend? Shelest's?"

"No, Ganshin's."

Berezhkov was surprised. But of course! Good old Ganshin, the bespectacled friend of his youth, had managed to turn out quite a few pupils since he had known him! Berezhkov looked at Nikitin and saw before him the march of time, as it were. Yes, time did fly. Ganshin had pupils. There was something of the Ganshin stamp about Nikitin, now he came to think of it—that flair for mathematics, the analytical turn of mind. And that sarcasm, too, if you like. But there the resemblance ended.

They discovered many subjects of common interest outside the exciting argument they had just had. They chatted in a friendly way, tossing questions back and forth as if relaxing after the first bout. The photograph of the ADVI-100 design was still tacked above the main section of the design signed by Nikitin, this sturdy young man with the white dazzling smile and the bluish little scar running down the side of his forehead. Where did he get that scar? A bullet wound? Berezhkov asked him.

"No," Nikitin said. "I was always fighting when I was a kid. A 'mix-up,' we used to call it here."

"Why, are you a local man?"

"Yes. But you know my father. You got hold of him, too, once, about those drawings of yours."

It came back to Berezhkov in a flash. Why, of course! Amazing how he hadn't guessed it before. That old man, the foreman of the foundry, with whom he had once had a long discussion, had the same high cheek-bones, the same

aquiline nose, perhaps slightly more beaky. They had something in common even in their tone of voice, their jerky manner of speaking.

"I say," Berezhkov cried, "your father could have the cylinder heads cast for us! The only thing is to get your factory to accept our designs."

"Why, doesn't Lubarsky accept them?"

"That's the trouble. Short of going down on my knees to him I don't know how to—"

"There's no need to do that. He'll get a knee in his back himself one of these days."

"But when? Tell me frankly, Comrade Nikitin, is there any chance of our ever getting our engine built here?"

"Frankly, I don't believe in your engine."

"Why not? Look. It's really faultless in design. European level, absolutely up to the mark."

"Granted. I even think it likely that on analysis, were we able to express both designs in terms of pure mathematics, yours would have the advantage. But you've got to consider at least two correction factors. First—the plant. Our thing is based on the plant's facilities, its equipment, its traditions. It spells further progress. Secondly—The second I'd call the maternal feeling."

"Maternal?"

"Yes. It'll be the same under communism too. We love this brain child of ours. And we'll fight for it, we'll go without sleep nursing it—the whole plant will. And we'll build it, we'll develop it, and give the country a real good Soviet engine."

"And what about ours?"

"The plant is obliged to make it. But I've already given you my opinion. As far as I'm concerned it's an abstraction, something alien to me."

"Well," Berezhkov said to me, "so that's how things turned out, my friend. I found no support at the design office either, no support with the young designer Nikitin. By the way, I picked up from him the expression 'maternal feeling' and fitted it into my own work philosophy as a per-

fectly natural element. It expresses exactly the designer's attitude towards his creation. It is no mere chance that the madonna with the infant, so often used as a subject in paintings, has been regarded as a symbol of creativeness all down the ages. But listen what happened next. I want to tell you of another meeting I had in that little town. The scene of that meeting is picturesquely set at the local stadium, where a football match 'Zadneprovye versus Mariupol' was then in progress."

23

Berezhkov wasted a whole day, arguing and kicking up a row in the works' office, and demanding of the management an official examination of his drawings. When the whistle sounded and the animated crowd began pouring out through the check-gate, he mentally sent everything to hell and decided to seek distraction. He got into the packed workers' train going to town and went to the football match which he had seen announced in a handwritten bill.

He took a seat on a crowded wooden bench and stared drearily at the field.

The teams came out, paraded round the edge of the field, then lined up facing each other in the central circle, scarlet shirts opposite dark-green shirts. The referee called the captains up. A tall, handsome young man detached himself from the green line of the Mariupol team and came forward at a light-footed run, while the captain of the home side, a none too young and heavily built man with a thick mop of brown curly hair came striding forward at a leisurely shambling gait. His girth under his black shorts and scarlet shirt was anything but slender. Something about him—the cast of his countenance, or was it his bearing?—struck Berezhkov as familiar. While he was taxing his memory, someone on the benches shouted out, "Nikitin!"

The town patriots of the home side greeted their captain with shouts of encouragement. Some of them called

him simply by his first name, "Andrei"—one could often hear above the hum of the crowd

The Mariupol youth smiled slightly, while the man who had been greeted as "Andrei" ambled forward quite coolly, swinging his powerful-looking arms. Nikitin . . . There it was, the family likeness—the same strong jaw, the same aquiline nose. Yet only a minute before Berezhkov had had a dim recollection of something else, something hazily remote that was somehow associated in his mind with a cold blizzard day, with snowy Lefortovo Platz in Moscow. Lefortovo? No, that couldn't be.

Berezhkov asked the man sitting next to him.

"Who's this Nikitin?"

"One of our factory workers. He's now studying in Moscow for engineer. Comes home for the summer."

"Is he a relative of Nikitin the designer?"

"Why, yes. He's the elder brother."

That accounted for his first impression. Berezhkov dismissed the matter from his mind and settled down to watch the game.

The match ended in a draw. When it was over, the Zneprovians tossed their captain in the air. Fans and friends of the home team rushed across the sand-strewn line, which, only a moment before, had been inviolable. Nikitin, smiling, flew up and down, tossed by dozens of hands. Again that smile struck Berezhkov as familiar. What could it be? Had he met that Nikitin somewhere before? But where? When? Was it merely the family likeness playing such tricks with his imagination?

24

The thing burst upon his mind half an hour later at the railway station where the local train bound for the works was drawn up.

Berezhkov was pacing the platform, undecided what to do with himself that evening. Through the window of one of the coaches he saw Andrei Nikitin again. He was now wearing a loose sky-blue shirt, which made him look even

broad in the shoulders than he was. His hair, brushed back from his forehead and still wet from its recent wash, was beginning to curl again. He was waving a grey cap to somebody.

Berezhkov looked round and saw Nikitin's father, the foundry foreman with the reddish moustache, standing behind the station barrier on the square. The foreman stood there, proud-looking, one leg thrown over his bicycle saddle, making no attempt to conceal the pleased smile that twitched his moustache. Before Berezhkov could take a second look, memory, like a revealing flash of lightning, snatched from the depths of his mind a long-forgotten scene. He spun round again. Nikitin was still waving his cap.

Why, of course! He had stood on the brake platform of the last receding car on that frosty day long ago, waving his fur soldier's cap to those who had come to see the train off. It was at Perovo station, near Moscow, in December 1919 when the first squadron of aerosleighs turned out by the Compass had been loaded on to trucks hitched to an armoured train. It was this same Nikitin, commander of the outfit, then quite a young man, who had come to collect the aerosleighs at the Lefortovo Platz. It was he, nicknamed "Death to Berezhkov," who had insisted on drill exercises being carried out in Berezhkov's presence and had demanded complete instruction. Then the loading in a blinding snowstorm. Stinging eddies of snow sweeping the planking. Machine-guns mounted on the sleighs, covered with tarpaulins. The last handshakes. The parting words of the young commander: "Thanks! I daresay we'll meet again some day!"

Meet again. Without a moment's hesitation Berezhkov jumped into the railway coach. The seats and aisles were crowded with football players and fans, all heatedly discussing the recent match. Berezhkov squeezed his way through to Nikitin.

"Comrade Nikitin!"

The latter slowly turned his head from the window.

"Comrade Nikitin! Andrei Stepanovich, if I am not mistaken?"

"Yes."

"How do you do. We have met after all. Don't you remember me? We built the aerosleighs for you. You and I—"

"Berezhkov!"

"You haven't forgotten me then?"

Nikitin's hand shot out and gripped his

"Not likely! Whenever we got stranded somewhere in the snow, we'd start remembering Berezhkov," Nikitin said in a tone of friendly raillery. "Make room there, boys. Sit down, Comrade Berezhkov. We had a good word for you, too, sometimes. Do you know, when we captured Rostov we drank to you and the whole of your Compass."

Berezhkov sat down, and soon they were engaged in a lively conversation, recalling their fighting experiences with the aerosleighs. Nikitin was a man of few words, and apparently preferred to do the listening. In relating various front-line incidents to Berezhkov he often paused, and went over his last words again as if to jog his memory. His speech was thoughtful and had the ring of truth in it, but that slow deliberate manner of his jarred on Berezhkov's more volatile nature. Before he knew it, he had interrupted Nikitin somewhere in the middle of his story, and started off on an excited description of the aerosleigh drive across the ice during the assault of Kronstadt.

Then the talk switched back to the present. Berezhkov had half a mind to tell Nikitin about his misadventures at the works. The train jogged along at a leisurely pace. Through the window one could see the Dnieper, now a blaze of glory in the dying sun. Someone called out to Nikitin:

"Andrei! Look at your old man! He's keeping up with us."

The bewhiskered old foreman was cycling along the twisting smooth-beaten footpath that ran alongside the track. He was pedalling away hard, all red in the face, his cap pushed back on his head, but still with the air of a conqueror. They called him Grandpa at the works, although the grey hairs in his bushy moustache were mere



specks yet. Aware that his son was looking at him, he put on a burst of speed without any apparent effort and shot ahead. Andrei laughed affectionately.

Meanwhile Berezhkov had fished another section photograph of the ADVI-100 engine out of his cream coloured jacket (God knows how many more he had there). Nikitin looked interested.

"Don't forget I'm only a student," he said with a smile.

He paused in his usual manner, then added that he was studying at the Moscow School of Engineering and this was his fourth year there.

"What specialty? Aircraft engines, I hope?"

"Naturally. It runs in the family."

He bent over the glossy card on which the design was printed.

"Whose signature is that? Shelest's? Professor August Shelest?"

"Yes."

"Wonderful professor," Nikitin said.

"Only yesterday your brother questioned his authority."

Berezhkov pouted in a hurt-child sort of way. He wanted to complain to the elder brother, but for all his resentment he could not help feeling a secret admiration for the younger one's restless daring. He saw in him a kindred spirit, a brother-designer.

"Oh, Pyotr? That's just like him," Nikitin said. "What is your trouble, Alexei?"

"Alexei Nikolayevich."

"What is your trouble with the engine, Alexei Nikolayevich?"

Berezhkov detected a new note of interest and respect in the words and the mode of address. He gave the history of his trials and tribulations right up to the previous night's argument with Pyotr Nikitin in the design office.

"D'you know what his line of argument is? Just this. The thing's an abstraction, it doesn't tie in with the works, and therefore it's alien to him. Of course, he won't put any obstacles in the way, but he hasn't any maternal feeling for it. What can you say to that?"

Nikitin smiled.

"He does get that way sometimes. Kinky, you know"

"But there is such a thing as a designer's sense of maternity—I know it from my own experience. That's just the trouble"

"Don't you worry. Dad has a way of tackling him when he gets like that," Nikitin laughed again. "We'll pit paternity against his maternity"

He stood up, leaned his broad shoulders out of the window and megaphoned through cupped hands

'Father!'

The pedalling old foreman was running neck and neck with the wheezy puffing little old engine, the works' "dolly" At the sound of his son's voice he slowed down.

"Father! Wait for me at the station!"

The foreman nodded, took one hand off the handle-bar for a moment to adjust his cap and pat his moustache, then started to catch up with the engine again

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"Well, Father, what do you say to it?"

They were approaching the little house of the Nikitins in the workers' settlement. Andrei was wheeling his father's bicycle. The foreman had put on his steel-rimmed spectacles and was examining the design of the ADVI-100 as he strode along at Berezhkov's side.

The setting sun gilded everything around—the grass, the cobble-stone road, the whitewashed little houses, the railings of the front gardens, the cherry-trees and the acacias. The sunbeams raised a bronze lustre in the foreman's hair, and his skin, as is often the case with red-haired people, was a deep pink. The only thing that betrayed his age was his neck, which was seamed and furrowed, tunnelled, as it were, by the rivulets of sweat that had run down it during the long years of work in the foundry.

"I've seen this already," the foreman said. "Comrade

Berezhkov consulted me about it the last time he was here and asked me to think it over "

"And did you?" Berezhkov asked eagerly

"I did. It's a tickler, let me tell you "

"But you'll be able to do it, Stepan Lukich, won't you?"

The old man pushed his spectacles up on his forehead with a single light careless movement, as if they were the customary blue goggles of the foundryman.

"If I don't do it, then who will?"

Berezhkov, to use his own expression, was dumb-founded. He had often, in his young days, uttered a similar phrase in the same swaggering manner, but had dropped the habit as he grew older. And now here was this old foreman, well on the shady side of fifty, this gifted Russian craftsman working with hot molten metal, this wizard of steel smelting, who still dared to speak like that.

"I knew you'd take it on," Andrei said with a warm smile. "But what about Lubarsky?"

"No Lubarsky of yours or any bally professor for that matter can stand up to me when it comes to practical handling "

The old man glanced at his son to see how he took it.

"Quite right, Dad. Now listen about Pyotr "

"Pyotr? What's the matter?"

"You just listen "

"What's the matter?" The old man stressed the gravity of the question by pulling the spectacles down on his nose, and looking at Berezhkov from under bushy eyebrows of the same reddish colour as his moustache.

"Have you seen his project?"

"I have," Berezhkov said noncommittally. "It's an interesting idea. We had a talk about it yesterday. I think it'll come off "

The old man gave a pleased laugh.

"You bet it will!" he said with conviction. "There are one or two of my own ideas in it, too. Pyotr got us old fellows together several times and had a palaver with us. At home we'd get to arguing so hot that I'd holler at him,

'Have you forgotten the way my strap unbuckles?' " He laughed again. "Yes, quite a few of my ideas there. I still drop in at the design office once in a while to see how they're drawing the castings and to give the boys some advice."

"But Pyotr doesn't want to recognize our engine," Berezhkov put in "He doesn't back us"

Berezhkov continued in this strain, while the old man scowled, and strode along making little grunting noises. Obviously, this complaint against his son made unpleasant hearing. On reaching his front garden he shouted angrily before he had opened the wicket.

"Is Pyotr at home?"

A girl's pretty face appeared in the window. She had the unmistakable family features moulded in softer lines—the same curve of the chin, the same bronze in her hair ("A ravishing beauty!" Berezhkov had exclaimed while telling his story. But then every woman's face, which had appeared, however briefly, in his narrative, has always, as we know, been adorable.)

"Why not?" the girl answered. "He's never home at this time."

"Never home, never home," her father grumbled. "He's never at home when he's wanted."

"But, Daddy, he's at the works."

"The works. Of course he's at the works. . ."

He shot another look at Berezhkov, a look which, angry though he was with his youngest son, said how proud he was of him. He came to a sudden decision.

"Let's go and see him there! Lyuba, take my bike, will you!"

The day was ebbing, the edge of the darkening sky painted with the brilliant hues of sunset, but the electric lights were already burning in the design office, where the windows, opened wide as the night before, stood out sharply. The leaves of the lilac bush above the window-

still looked darker and more clearly etched than the lower ones against the smooth surface of the wall

Stepan Nikitin made a move towards the window, then changed his mind and turned towards the main entrance. The doorkeeper greeted him with a friendly, "How d'you do, Stepan Lukich!"

But the foundry foreman merely nodded, crossed the hall and strode down the corridor. His companions—Berezhkov and Andrei Nikitin—followed a little way behind. At the door of the design office the old man looked back at them, muttered something into his moustache, paused, took hold of the door handle, then changed his mind again. He got a black case, old and frayed, out of his pocket and planted his steel-rimmed spectacles on his nose. This at once gave an air of gravity and importance to his mobile face. He must have felt different, too, because he opened the door with a calm dignified gesture, keeping his temper well under control, and walked in.

"Hullo, chicks! How's the work going?" he said, smiling.

"See for yourself," Pyotr Nikitin said. "We don't want to blow our own trumpets. Ah, Andrei here too! And Comrade Berezhkov! Come in."

He put down his drawing-pen and tossed back an unruly lock of hair with a jerk of his head. His hair, which was fair and curly like his elder brother's, looked somehow finer. So did his figure in the blue duck jacket, his neck, the shape of his nose, and lips, and even his grin. He made a sign to his assistants that they could stop work, and proceeded.

"I'm sorry, Andrei, I just couldn't get away to see the match. It was a stiff game, I hear?"

Andrei said nothing.

"And you didn't let the boys go either?" his father said.

"I couldn't. When we're through with this design, we'll turn out in the field—the whole team." He looked at the faces at the drawing desks and straightened his shoulders. "We'll chase the ball a bit then."

The old man grinned and shot a look at Berezhkov, obviously pleased with the answer of his youngest son. The next moment he looked grave again, and went round the desks, carefully examining the sheets of drawing paper lying on them. Coming up to the tow-haired youth, who had been using his wrist as a pen-wiper again, the old man muttered

"You look a sight, you dol! What's that you're drawing?"

"The bushing, Stepan Lukich."

"So I see. But what bushing?"

"The rear one of the camshaft."

"Then why don't you say so? And why is the lug so small? Didn't I tell you it had to be thicker?"

Pyotr grinned.

"I can show you the calculations if you like, Dad."

"Calculations. Don't talk to me about calculations. It'll be handier to cast and machine that way."

"I've considered your suggestions, but I'm sorry to say that in this particular case they haven't convinced me."

"Oh, they haven't, have they?" his father shouted, flicking his spectacles up on to his forehead with an angry gesture. He checked the outburst, however, and nursed his wrath to keep it warm. Dropping the spectacles back into place, he said.

"Give the boys a rest for a minute or two, Pyotr. Let them stretch their legs a bit."

"Certainly," Pyotr said, grinning again.

The old man, his lips working, went up to the large framed drawing of the Zadneprovye-100 hanging on the wall, stood there until the door had shut behind the last of the office employees, then wheeled round.

"What's this I hear about you putting spokes in Comrade Berezhkov's wheel, Pyotr?" he demanded point-blank.

"I'm not. As a matter of fact I have nothing to do with this Moscow project at all. It's the chief engineer's business. But if you ask my opinion, I tell you frankly that the whole conception of that engine is alien to me."

"How can you prove it?"

"Truth is proved in practice. You'll have proof enough when we've built our own engine."

"But what will that prove? You'll have your engine, while he'll have his blueprints. You won't let him build it."

"I've told you already that I have nothing to do with this—"

But the old man was no longer listening.

"Why don't you give him a chance to prove it in practice? Do you mean to say we won't be able to build that engine of theirs? We'll test the two of them side by side and see for ourselves which is the better."

The old man glanced at Andrei and Berezhkov, seeking approval. Berezhkov nodded slowly.

"That's the line you should have taken with him, Comrade Berezhkov," the old man continued. "He ought to know better."

Pyotr was about to answer, but his elder brother interrupted.

"No, Pyotr, you didn't go about this thing in the Party way, I'm afraid."

They were the first words he had uttered since he had come in.

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"If you think," Berezhkov said, continuing his story, "that I succeeded in getting production started on our designs as a result of my meeting with this wonderful family of the Nikitins, you are badly mistaken. We still had a hard fight facing us. Lubarsky turned down the drawings again, this time on the pretext that the works wasn't tooled for the handling of such a complicated construction, and therefore further simplifications were needed. All this was set forth at great length in a most business-like and courteous official letter signed by 'Chief Engineer V. Lubarsky.'"

Berezhkov returned to Moscow with that letter, gnashing his teeth, as he expressed it. In Moscow he and Shelest had hard things to say to one another. The

former junior draughtsman, for the first time since he had joined the staff of the ADVI, rebelled against his director. Reporting his meeting with Lubarsky, Berezhkov waxed indignant.

"I shouted at him that I'd crush him."

"That was stupid. Very stupid," Shelest said. "You went with a definite intention of improving relations, and instead of that—"

"I don't regret it. I'll take the matter higher, if need be. I'll go straight to Rodionov."

"Haven't you done enough mischief? Rodionov, I assure you, is perfectly well aware that the works refuses to handle our engine. I have written to him about it and spoken to him, too."

"You didn't sound convincing enough, then. Didn't use the right words. The trouble with you, Professor, is that you haven't the nerve to say that the post of chief engineer at the works is occupied by a man whose proper place is in prison. He's a cold blooded murderer, a scoundrel who is coolly strangling our project. That's what you ought to write Rodionov."

"Thank you, informing on people is not in my line. And let me tell you that I don't care to see others doing it."

"You don't care for your job, Professor. You don't love your institute enough, you don't love the engine. Because of that everything may be ruined."

"Everything! All God's world will come to ruin! What a man! You have for exaggeration! I'll be seeing Rodionov, of course. I'll tell him the situation is intolerable."

"That's right."

"But with none of your personal attacks. You can't cast a slur like that on an engineer, Berezhkov. It's ungentlemanly. There's such a thing as the honour of the profession. You behave as though these things don't exist for you."

"No, they don't!"

"Then, I'm sorry to say, we have different notions of honour and decency," Shelest said acidly.

"I'm afraid we have!" Berezhkov said defiantly.



They did not actually quarrel. After having let off steam, Berezhkov quieted down for a time, and left the Professor to pursue his own course. But both remembered this clash for years afterwards.

The negotiations, correspondence, and wrangling between the Institute and the works continued for another two or three months. Rodionov reported this outrageous case of red-tape to the Central Committee of the Party. The director of the works was summoned to Moscow and ordered to start building the ADVI-100 without further delay. They started on it. Another ten or eleven months elapsed.

"We travelled back and forth to the Ukraine again, protesting, arguing, kicking up rows and worrying," Berezhkov said.

At long last, he went on, the day came when our engine was ready. We rejoiced. Our creation, which had existed till then only in blueprints, had seen the light of day. However, we were afraid to test the engine at the works, where we were still regarded as outsiders and where we would have to start fighting again, demanding or begging technical assistance, so we decided to bear the newborn infant off to Moscow and try it out at home in the Institute's workshops. We had no more need of the works, we thought. There's no place like home and your own machines for developing an engine.

So we brought the engine to Moscow. It was the biggest mistake we ever made. By that very act we were doomed to failure. You can't develop an aircraft engine and get it to work smoothly and reliably outside an industrial plant and the technical facilities which it provides. You can start it up all right, it'll run, for a while, but . . .

We got stuck in a mire of these "buts." It cost us many a tragic lesson before we learned one simple truth, which I have already mentioned several times. So excuse me

for repeating it again work on an engine does not really begin until you run it

But we saw things differently then. We thought we had accomplished a tremendous and decisive phase. the project had been thought out, the designs were got up, innumerable difficulties were overcome, the engine was created, and all our troubles were over. This had taken nearly two years. Now all that remained—a mere trifle, it seemed—was to test the finished engine and get it accepted by the state commission. But engine trouble—oil leakages, over-heating of the bearings, and dozens of other infantile complaints—started from the very first hour of testing. We tried to tackle it ourselves, and made replacement parts on our own lathes, but a dozen other failures cropped up for every one we dealt with. But we didn't lose courage. After repairing the breakdown, we'd start up the engine again, and again it would fail. The faults, to our horror, ran up into hundreds. I am not exaggerating. Sometimes I thought I was going mad. The flaws were like so many snakes creeping out of all the engine's joints and assemblies. We chopped their heads off, but new ones sprang up in their place as in some ghastly fairy-tale. And they kept multiplying and multiplying.

We were obliged, after six months of this hell, to take that engine back to the works—and very foolish we looked, I can tell you.

Meanwhile, the group of young technicians and engineers at the works headed by Pyotr Nikitin had completed the construction of a hundred horse-power aircraft engine of their own design. Another engine of the same power had been built by the designing group at the former Icarus Works. These people had it easier. We were sort of gale-crashers, you know, outsiders. While we cursed the terrible snail's pace, and had to beg them to hurry up and eliminate this or that fault, the two bodies of designers we were competing with had every facility at their disposal.

Even then, these works' designing groups had a pretty tough job tackling their own faults. As a result none of us at that time succeeded in creating a low-powered,

mere 100 h.p., aircraft engine, and putting it in a fit condition to pass the official long-run test of fifty hours.

We set our teeth and went on developing and testing the ADVI-100. I travelled south again, spent days and nights at the Zadneprovye Works, demanding, begging and threatening, then suddenly a strange thing happened to me. After all the hard work we had put into that engine of ours, I suddenly lost all interest in it.

29

I don't know how to explain it to you, Berezhkov continued. Imagine yourself writing what you think to be a very interesting novel, keenly aware that it is sure to make a tremendous impact and that the public are hungering for such a book. You work on it enthusiastically, putting on the last touches, when suddenly you feel, first in a vague sort of way, then ever more distinctly, that something odd has happened. You don't yet realize exactly what it is, but your intuition tells you that your unfinished book is already out-of-date, has lost its impact. Something in the times has undergone a sharp change, new, more daring aspirations, new people you've never heard of have come upon the scene. You finish the book by force of inertia, but at heart you know that it isn't the thing.

What's the reason? Of course, in every such case numerous factors are at work. One of them, in particular, is Time. You've missed it.

While pegging away at the ADVI-100, I began to realize that time was slipping by like a train from the man who'd missed it. A train . . . The locomotive of Time.

I should like to mention here one psychological touch, which, I am sure, is very important in the work of a designer. I mean the sense of Time.

Years ago I sat for my entrance examinations at the Moscow School of Engineering. I was supposed to take them in Russian, mathematics, physics, and the Bible. My first exam was Russian—composition, a test paper

Grave solemn atmosphere, profound silence. A huge round clock ticking away over the professorial desk. The subject was announced—Time. I sat for a long time thinking. Of course, one could write something about the geological ages about the history of the Earth and civilization, or about time being money (that phrase was then the vogue), but it occurred to me that everyone would write something of that kind. And to write like everybody else, I thought, wasn't at all interesting.

I sat staring at the clock, and suddenly saw the minute hand give a twitch and move on by one division. At that moment I had a real physical sensation of Time. The composition sprang to my mind all complete, as it were, and I started writing.

I began like this. When a man sits in front of a clock, it seems to him that Time barely crawls. Whenever he looks at the hour hand, it seems to be standing still. But when a man is rushing along in a motor car the passage of time becomes more obvious to him. Before he can count "one, two, three," several telegraph poles will have flashed past him. Nearer objects—the stones in the roadway, for instance—will even merge into an endless ribbon. Every second, every fraction of a second, is a particle of this rushing ribbon.

In this picture I showed Time as Movement. I remember boldly declaring that at a temperature of 273 degrees below zero Centigrade Time did not exist, because there was no movement at such a temperature, there was absolute death, absolute Interplanetary zero.

I compared our times, the twentieth century, to an express train rushing along at full speed.

Don't smile. You must make allowance for the times, and especially for the age of the intrepid philosopher who was scribbling away at his desk.

Well, then, I compared our age to an express. I was keen to spend my life in such an express, so I put myself there as one of the passengers. But the moment I put down the word "passenger" I felt that it grated on my ears. No, I wrote, carried away by my own enthusiasm—travelling in a coach was not for me. It was on a locomotive.

tive that I dreamed of spending my life. A locomotive, where I, too, could take a hand in speeding up its progress.

I described the movement of the train in picturesque terms. Life's stages were the stations at which the train stopped. Here we lost some of our fellow travellers, whose places were taken by others. But where I really let myself go was when I described a man who had dawdled and missed his train. The express steams out, and through the window we see the man running; he almost catches up with the last coach, but the train gathers speed, it is clear to everyone that he won't make it, yet he still strives frantically to do so. The express rounds a bend, and we are given a last glimpse of the running man. We see him dropping behind with every passing moment, we see Time stepping between him and us.

For us, future engineers, I wrote, life was a furious rushing onwards, an engineer was a man of technics, if you wanted to live at one with your age you had to keep abreast of the times, take care not to drop behind the Express of the Present. On that note I finished my composition and got an excellent mark for it.

And now, in 1928, while working hard on the ADVI-100, I felt that Time was beating me to it, like a train receding from the man who had missed it.

I began to have nightmares. I dreamt that I was running somewhere—elbows pressed to my sides, body thrown forward, knees working furiously, breath coming in gasps—then suddenly it would come to me with a shock that I wasn't moving, I was just marking time. I made frantic efforts in my dream to tear myself away from the accursed spot, but it was no use—that ghastly standstill running continued.

One evening Ganshin dropped in on Berezhkov. The latter was lying in his room on the sofa. He often spent his evenings now that way—just doing nothing, not

touching drawing paper or books, and not even bothering to switch the light on.

He heard sounds in the passage, heard his sister Alasha greeting the visitor. At any other time he would have run out to meet his friend with a joke and a smile, but now he had no desire to get up. He heard Ganshin saying

"Is Berezhkov in?"

"Yes."

"Good. I need him."

Need him? Berezhkov's heart gave a bound. He jumped up. He had a feeling as if his life were going to take some unexpected happy turn. That had often happened to him before. This was not the first time that Ganshin had been the harbinger of some new and exciting phase in his career. He recollected a winter evening years ago—1919, to be exact—when Ganshin had come into this very room, through that very door, crying out, "Berezhkov, we need you! We need you badly!" And within five minutes the friends had been racing through the moonlit streets of Moscow on a motor-cycle to attend a special meeting of the Compass. And now again it was winter, and the moon was shining! There it was, standing in the pale rectangle of the window, shedding a faint bluish lustre in the darkened room.

Berezhkov groped hastily for his slippers and ran out to meet the man who had just uttered that electrifying phrase, "I need him!"

Ganshin had taken off his heavy fur coat and fur-cap and was wiping his misted glasses with a handkerchief. Divested of spectacles, his face lost its habitual mocking air, and looked rather mild and helpless. Now a well-known professor, a theoretician in the field of aircraft engines, he was in charge of the Power-Plant Department at the Central Institute of Aviation, and was always so busy and preoccupied with his researches that he seldom had time to spend an evening with his friend.

Berezhkov gripped Ganshin's two hands and his eyes sought Ganshin's eagerly.

"Wait a minute! Don't put your glasses on! Say something offhand—the first thing that comes to your mind. It doesn't matter if it's something silly or absurd—come on, say something—anything!"

Disconcerted for the moment, Ganshin smiled embarrassedly. Berezhtkov searched his near-sighted eyes.

"Well!" he urged.

"It's an interesting little problem," Ganshin murmured. "They'll pay you well for it."

"Pay well?" Berezhtkov said, releasing his grip and letting his arms drop limply.

"What's the matter?"

"Put on your glasses," Berezhtkov said with a melancholy shake of his head. "That's not it. Not the thing, Ganshin."

"I'm sure it'll get you. It's a very interesting commission. I got to know of it quite by chance, and said right away there was only one man who could do it, and that was Berezhtkov."

Ganshin expressed himself in terms which had never before failed to evoke a response in Berezhtkov. But the latter said:

"And now you're lying. What for?"

"I'm not. What's the matter with you?"

The question was a rhetorical one. Ganshin knew very well that his friend was in the doldrums, and he and Masha had conspired together to rouse in him the old lusty-living Berezhtkov, for ever brimming over with irrepressible enthusiasm and fun. Ganshin had never approved of his friend's past errors and aberrations, and considered that he ought to stick to his work in the Aircraft Engine Institute and not let himself be diverted from his straight chosen path. If he made an exception from his rule on this occasion, it was only in order to help turn his friend's thoughts away from their dismal trend. He had gone out of his way to discover for him a serious designing problem, one which, moreover, promised a considerable fee in case of its successful solution. And

that, too, as we know, had hardly ever failed to strike a responsive chord in Berezhkov's soul.

But something went wrong from the outset, from the very first words that were uttered.

31

Presently all were sitting in the dining-room. Coffee was being made on an electric hot-plate. Berezhkov was still in his flannel dressing jacket. His face, always a healthy pink, was now noticeably tinged with yellow, and somewhat puffy-looking. The corners of his mouth no longer had that boyish upward twist. Ganshin laid a packet on the table—evidently some papers—then moved it up with a significant "There!" and lifted a forefinger à la Berezhkov but even that device, calculated to excite the notorious Berezhkov curiosity, had no effect whatever.

"What's the matter with you, Alexei?"

"Nothing. I'm working. An employee."

"Aren't you ill?"

"No, my temperature is normal."

"Then it's mental?"

Berezhkov smiled.

"That's nothing. I'll sleep it off."

"Why don't you ask me what I've brought you?"

"I did."

"And that packet? Why don't you yell, 'Show me!'"

"All right, show me."

The packet was opened. It contained two American magazines. In one of them, among other publicity matter, there was a full-page advertisement of the Cross Automobile containing several photographs.

The car had an air-cooled engine. A feature article in the other magazine had some fifteen to twenty lines devoted to that engine which was described as being the last word in engineering. No designs were given, no details, not a single drawing.

"We want a tractor engine of that type," Ganshin said. "A sixty horse-power air-cooled motor. They're looking



for a designer. Who can design such a motor? Berezhkov, I said. He's your man."

Ganshin went on to give a very clear analysis of the problem with a rough estimate of thermal efficiency and dashed off two or three equations in the margin.

"They want the thing done in six months," he said. "But it won't take you more than a fortnight, I know. It will bring you three thousand rubles. That's what will be paid to you under the contract."

Berezhkov examined the photographs in silence.

"Well, why don't you say something? Will you do it?"

"I suppose so. Thanks. I'm not very keen on it, but I'll do it."

"What's the matter with you?" Ganshin asked again.

"What do you want?"

"What do I want? You understood me once. And now. . . . Now we are so different."

"Tell me, though."

"I want American designers to be examining the photos of my engine—our engine, Ganshin!" Berezhkov said. "And I want them to say to each other, 'Dammit, not a single design, not a hint that would help us to make the thing.'"

Ganshin was silent.

"I want to be doing something big, something marvelous!" Berezhkov continued. "I'm sick of the office, sick of that piddling hundred horse power engine we've been messing about with these last two years and which is now hopelessly out-of-date. I'm sick and tired of it all, old chap. D'you remember the things I used to dream of? Oh, what's the use of talking!"

"But you know as well as I do that there are no marvels in technics," Ganshin said. "Everything has got to be prepared by previous development. There are laws of technical culture, and you can't just ignore them."

"That's just the damn trouble!"

"But why? You're simply snivelling. The standards of engine construction in this country are rising, we're making progress."

"Progress." Berezhkov said with a hopeless gesture.

He stopped arguing and dropped back into his apathetic mood. Ganshin went on airing his ideas. No technically minded man could any longer doubt that a Soviet aircraft engine would soon be created. If it hadn't been done yet, it would be done within a year or two. We now had the groundwork for it, we had several plants. The thing now was to set to work. Industrial culture was steadily rising, the research institutes were extending their activities. What more could you want? To astonish the world with marvellous designs? Skip all the intervening stages in some miraculous way? Nonsense! That never happens. It was time he became a realist, learned the philosophy of an engineer. Take Ladoshnikov.

Berezhkov roused himself.

"How is he? What's he doing now?"

Ganshin told him that Ladoshnikov's new big airplane the LAD-8 had had successful air trials. Berezhkov was interested in the details. What was the wing-span of that LAD-8? What was its performance—speed, load-carrying capacity? How many engines did it have? One? What make? What power rating?

"Ladoshnikov," Ganshin said, "has had an eye on the Meibach, latest model, six hundred and fifty h.p."

"The Meibach?" Berezhkov murmured.

He was suddenly reminded of the LAD-1, for which it had been intended to use a German Meibach engine stripped off a Zeppelin which had been brought down by Russian AA gunners during the war. It had then been the most powerful engine in the world, not counting the Adros, of course. But where was the Adros now? Abandoned, dropped.

Ganshin went on lecturing him.

"Look how Ladoshnikov works. It's a feat of orderly sequence. He goes forward from one design of his to another with iron logic, whereas you rush helter-skelter, jumping from one thing to another. You've got the dream project on the brain. What do you think you are? A thwarted genius? An unrecognized artist? It's time you realized that you're not an artist but a man of technique. You can mope and sprawl about on that sofa for a year,

for all I care. We'll get our engine made without your help. It'll be a low-powered one at first, but then we'll steadily build up power in a rising curve. Make that curve your own rising path. There's no other path for you. Face your failures like a man, and get down to work. And for goodness' sake throw those dream projects out of your head!"

Berezhkov sat listening meekly. Yes, Ganshin had found his place in technics, in science. He had made his name as a scientist and his life was clearly mapped out before him, whereas he, Berezhkov, was floundering and had lost his grip on life again.

Masha said

"That'll do chiding him, Ganshin. Let's try and amuse him for a change."

"Good," said Ganshin. "What about making up a New Year's Eve party? But not here!"

"Why not?"

"Because this mope," Ganshin said, giving Berezhkov a poke, "is simply oozing with the fluids of the dismal. The place is flooded with them. Let's have a party at my flat, eh? It'll be like old times. We'll let ourselves go with a bang! What?"

"Yes," Berezhkov said listlessly.

Masha fell into conversation with Ganshin. She was glad of the visitor. Berezhkov sat brooding, looking careworn, aged.

Ganshin retailed some items of news. Projecting in industry, especially in mechanical engineering and metallurgy, was noticeably reviving. New works were being planned. Important decisions were said to be impending in the aircraft industry too.

"New works?" Berezhkov asked. "Engine-building works? Where?"

Ganshin didn't know. There was talk about a works being built for manufacturing engines of the Meibach type. At least, Ladoshnikov had submitted a memorandum to the government pointing out the necessity of such a works for supplying engines for his new LAD-8 airplanes. There were rumours of other new works going up. The

old ones, too, he heard, were to be extended and re-equipped. The "Amo" motor-car works in Moscow was definitely going to be reconstructed. Projecting work had already been started on.

Neither of the two friends knew at that time that these rumours were forerunners of the First Five-Year Plan, the famous *pyatiletka*, and that within less than six months that plan would be promulgated to the nation and the world at large from the platform of the Party conference. That evening Berezhkov did not yet realize that the brooding misery in his heart was just a hunger, a deep-felt yearning for that new era of great and wondrous deeds.

"Designers and constructors are in great demand these days," Ganshin was saying. "You're moping now, lying about doing nothing, while your day is approaching. Get up, take your pencil, and draw away for all you are worth! I'm positive you'll astonish us all with your career yet."

Berezhkov recalled a phrase he had read somewhere. "The poet has no career, he has a destiny." He uttered the words aloud.

"Incorrigible!" Ganshin cried with a gesture of despair.

Berezhkov's heart gave a flutter of joy. "Incorrigible! Then I haven't changed much! I'm still recognizable!"

"I say, Mr. Poet," Ganshin proceeded, "have you heard the rules for tram passengers composed in verse? One of them runs like this. Forget your empty fancies, friend, just pay your fare, and there's an end. Do you get it?"

"I'm not interested."

"Forget your empty fancies, friend!" Ganshin recited once more. He laughed. He liked the couplet. When taking his leave, he repeated his invitation to Maasha and her brother to join the New Year's Eve party at his flat.

"Nineteen hundred and twenty-nine," he said. "And I'll soon be thirty-six."

"I'll be thirty-four. And I haven't done anything yet."

"Hurry up then and make that air-cooled motor. Go and sign the contract tomorrow—don't put it off. Will you go?"

"All right. Why not make a little extra money "

"Trying to be sarcastic? Oh, stop moaning, can't you!"

"All right, I will "

Ganshin was a long time putting on his goloshes and coat. When he was properly muffled up, he suddenly announced

"There's still a chance of peppering you up—a last resort."

"What's that?"

"Be sure and come on New Year's Eve. I've got a surprise for you. A New Year's gift.

32

After seeing the visitor out, Berezhkov picked up the magazines, which Ganshin had left in the dining-room, and went into his own room with them. The quartered shadow of the window-frame lay silhouetted on the floor in the blue moonlight. Berezhkov stared moodily at the shadow. Only an hour or so ago, lying in this room, he had heard Ganshin exclaim, "I need him!" and had jumped up as if it were the call of destiny. Now his friend had gone and nothing had changed. The order? Well, he'd do that, and then what? Smiling bitterly, he switched on the light, laid the magazines down on the table and began idly turning over the pages.

His fingers slid over the stiff, chalk-white glossy paper. The printing inks—black and coloured—were vivid and intense. The magazines of the young Soviet Republic had no such paper, no such inks. The very feel of the pages he was turning over was like contact with some other world—a Western foreign world unknown to him. Here was an advertisement of General Motors, another of Wright, of Sydney, there was the Ford trade-mark in a small oval frame.

Berezhkov turned the pages over mechanically. The notices, advertisements, headlines, photographs, drawings and diagrams conjured up a vision of American

aircraft and automobile engine production, a picture of Industrial America.

The double-page advertisement of the Sydney engine featured a springing leopard. The advertisement announced the issue of a new Sydney-Leopard seven-hundred horse-power aircraft engine. The firm named its engines after the feline species—the Sydney-Puma, the Sydney Jaguar, the Sydney-Lion. This new peak in engine power, Berezhkov knew, had been achieved simultaneously by several competing American firms. The latest German models such as the Melbach, the BMW and the Typhoon came close to them in power output.

And this country? The Soviet plants, with the greatest difficulty, had started to turn out three-hundred horse-power aircraft engines, and even those were of foreign design that was already out-of-date in the West. Not a single engine of our own, created by Russian designers! Damn it all, had we run to seed! Had anyone ever proved that the Americans or the Germans were smarter, cleverer than we are! No, Berezhkov would never believe it.

It was over four years since he had first apprenticed himself to Shelest at the Aircraft Engine Research Institute in the humble capacity of a junior mate. He now realized what excellent team work could be done under the direction of such an able man. Work on his staff had given him, Berezhkov, a thorough schooling, a sound theoretical training, had, without exaggeration, made a splendidly educated specialist out of him. He had studied avidly, had simply devoured everything—all the latest researches and designs—that had to do with his specialty. Of course, the designs of the most up-to-date and high-powered engines were a commercial secret of the foreign firms concerned and were not published, but Shelest's Institute now received actual samples of engines imported from different countries. These engines were studied at the ADVI testing station, the equipment of which in the new building of the Institute Shelest had personally attended to with love and enthusiasm. Numerous measuring instruments and apparatuses had been

imported according to lists made up by him. No request of his for special gold currency appropriations for that purpose was ever refused by the A.F. authorities.

"You'll get everything you want, Shelest," Rodionov had told him, "only hurry up and give us a Soviet engine for our aviation."

But Shelest did not content himself with foreign-made equipment. He had been for some time nursing various ideas about instruments that were unknown abroad. Occasionally he would slip an arm through Berezhkov's and saunter up and down the tiled testing hall with him, now and then peering affectionately into his eyes and confiding his plans to him. Sometimes during those conversations it happened that Berezhkov, with characteristic smiling ease, would hit on a structural solution of one or another of his ideas. Not all of them, of course, lent themselves readily to concrete embodiment. Some things would not work right away, and had to be redone and readjusted again and again. Shelest was proud of his testing station. He claimed that it was second to none of its kind in the world. A special outdoor stand had been rigged up for testing extra powerful engines. The roar and vibration within the building during the boosting of such an engine would have made work for the staff impossible.

Berezhkov, with a zest and enthusiasm that never flagged, threw himself upon every foreign-built modern aircraft engine that was delivered at the Institute. He spent hours over them, taking them to pieces, reassembling them and making rough sketches of the principal sections in order to grasp the idea of their designer. These constructions very often contained elements that exactly duplicated things which he had long since conceived in imagination and sometimes even drawn on paper, but which he had not constructed, had not had a chance to put into effect. He had a feeling then as if someone had stolen some happy idea of his. But he did not resent it. At that time his belief that he would yet have his day, that sooner or later he would create the finest engine in the world, had not been shaken. Seeing

a construction which he had long ago envisaged himself, he would say to its unknown inventor, as it were, "Well, well, let's see how you've managed this." Sometimes the solution would rouse his admiration, but never, during these imaginary colloquies with foreign designers, did he bend the knee of worship or admit to himself, "This man is a genius. I could never do it." On the contrary, he always felt somewhat disappointed, he always had a definite feeling that "It can be done better!"

Recently both Shiest and Berezhkov had taken a great fancy to a graceful 500 hp American Wright engine for a hydroplane. Its designer had very effectively handled an idea which had been theoretically treated and developed by Shiest. The constructor's brief idiom for this idea was rigidity. It formed the title of a large chapter in Shiest's book, containing numerous calculations and formulas. The Wright was an engine of the block-cast type, which had never been applied before to aircraft engines. Long before he had ever seen the Wright, Berezhkov had come round to the idea that what the modern aircraft engine needed was blocked cylinders. He had seen such a construction in imagination and had even put it down on paper. And now, when examining the engine imported from America, which lay disassembled in the ADVI erection room, Berezhkov once more had the feeling as if someone in a foreign land had stolen his idea and made use of it. But now that feeling was flavoured with bitterness. Was he to just waste his life looking at other people's achievements? And again—this time sadly—he mentally addressed the unknown designer. "Ah, well, let's see how you've managed it." He quickly put his finger on the engine's weak spots, which, though hidden to the layman, were glaring to Berezhkov's keen practised eye. The designer of the Wright engine, talented though he was, had no flair for general lay-out. While giving rigidity to the bank of cylinders, he had not quite coped with the more serious over-all problem of applying the same idea to all the elements of the construction and giving rigidity to the lay-out as a whole.



At the same time Berezhkov saw clearly—perhaps more clearly than the Wright designer himself—that this engine with its block-cast system had in it latent potentialities which made it the most advanced of its kind in the world. He felt that he had it in him to prove that, to bring out those potentialities in some new construction. He had the old feeling—"I can do it better."

Not infrequently after the stand testing he felt irresistibly drawn to the desk and pencil. He was eager to commit to paper his mental creations, those brain children that, springing to life within him, haunted him and gave him no peace. No one commissioned these jobs. He did them because he had to, because he couldn't help himself. With a dreamy shamefaced smile, like a man in a trance, he would sometimes shut himself up in his room in the evening and, dead to the world without, start drawing, putting down on paper the designs that stood imaged in his mind. And then, coming down to earth with a shock that made his spirits sink again, he would crush the sheet of paper, literally fling it away into a corner together with the pencil.

Who, what was he drawing for! At what plant would they build the thing!

Drawing for drawing's sake? Just for himself? Art for art's sake? No, Berezhkov had never gone in for that kind of thing. He simply couldn't understand how a man of technics, of industry, a creator of engines could find satisfaction in working out detailed designs that were doomed to remain on paper.

But why should they be? A works, a works, wide factory facilities—that's what they needed!

His head dropped. He stood at his desk, no longer turning over the pages of the magazines, but gazing sadly at the advertisements of the American engines.

Yes, he could do it better! In the solitude of his room, face to face with his own conscience, Berezhkov repeated this to himself without a trace of conceit or self-decep-

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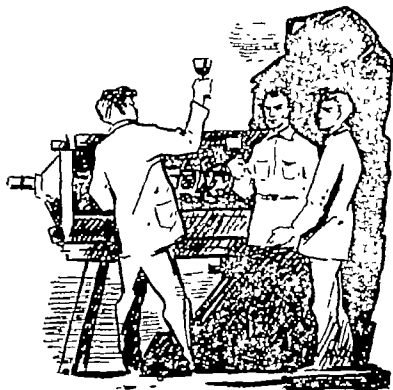
tion. He knew his own capacities now, was aware that his talent had matured. He had once done things by sheer instinct, by a sort of marvellous flair that was almost inexplicable but now that he had received a sound education and a good practical training on Shelest's staff he had acquired clarity of vision in the highest spheres of engineering, both theoretically and technically.

But to what use could he put his powers? He thought of that black pessimist, that philosopher of despair Lubarsky, who had built a toy motor just for his own amusement. How that engineer with the Mephistophelian beard had sighed when turning over the pages of the French picture books!

Berezhkov mechanically picked up one of the American magazines. His thoughts went back to Robert Vale, that genial, beaming American with the growing paunch. It was a long time since Berezhkov had challenged him, "You wait till we get going!" Yes a long time. Berezhkov was already thirty-four, and he hadn't created a thing yet except some drawings and several uncompleted, abandoned motors.

How could he change all this? What would Berezhkov say if he were asked, "What do you need?" A works! An industrial plant where his drawings, his fantasies would be turned into engines—that's what he needed, that's when he would cross swords at last with all the designers of Europe and America. He had a fleeting vision of such a works. It had a water screen at every check gate. One had to undress first, pass through the warm cascade, and put on a white suit on the other side before stepping into the sacred precincts of the works. In all the shops everything was spick and span and shining!

Ah, dreams, dreams! With a sigh Berezhkov turned off the light, and lingered at his desk, gazing at the square of moonlight on the floor with the quartered shadow of the window frame silhouetted in it.



NEW YEAR'S EVE

1

Berezhkov, offhand, gave the exact date of the new turning-point in his life. It was certainly not a thing that one was likely to forget if only because of its peculiar, I should even say, odd nature. The event in question took place on the very eve of the New Year, just a few hours before the passing out of the old year 1928.

"If we succeed between us in faithfully rendering that evening," Berezhkov said, "we shall have written the

New Year's tale of the century. Something absolutely fantastic and at the same time perfectly true. You and I are now coming to the days of the *pyatiletka*—the five-year plan. An epoch of fantastic doings. I got my first glimpse of it that evening, on New Year's Eve, and it gripped me at once."

Berezhkov woke up that day with an odd feeling of elation. "I wonder why?" he thought. He went up to the calendar while dressing, tore off yesterday's sheet and looked at the new one dated the 31st of December, the last day of the year. He was glad the year was going out at last—it had brought him no luck. Probably that was what accounted for his elated mood. What faced him that day? He was going to Ganshin's New Year's Eve party. Ganshin had promised him a surprise that night. What could it be? Perhaps an unexpected and delightful meeting?

Berezhkov looked at the calendar with the year 1928 underlined in black printing ink as if for emphasis. Over five years had flown by since the evening when he had bought two nickel-plated nuts at the exhibition kiosk near the Metal and Electricity pavilion. He had lost that little nut a long time ago, a nut he had intended to keep as long as he lived. He had lost that prim little maid, too. What if she turned up, though? No, it would be absurd to expect to meet Valentina at Ganshin's place that evening. Ganshin did not even know about their having met each other at the exhibition. "You can never tell, though!" Berezhkov mused. A happy New Year.

Berezhkov couldn't remember exactly what he did that day.

The large well-lighted drawing-room of the Institute was noisier than usual. The holiday mood had already invaded the official atmosphere and upset the routine. Everyone waited impatiently for the working day to be over. Everyone looked forward to the traditional night of festivity among friends, where all kinds of toasts are proposed, and wine and jollity flow until the early hours of the morning.

Round about one o'clock Professor Shelest came in. He had been lecturing somewhere all the morning. He did not seem to be any too keen on business either that day. He gave a nod of general greeting, and instead of passing into his private office or going up to the desks of the designers, he stopped to warm his back against the hot white-tiled stove. Swarthy, with the keen profile of an eagle, and streaks of grey in his hair, he stood there in silence, warming himself at the stove and gazing out through the window with a faint pleased smile.

It was here that his secretary eventually found him.

"The A. F. Headquarters have been on the 'phone twice, Professor. They asked me to let them know the moment you got back."

"Very well, get them," Shelest said.

A minute later the following telephone conversation took place.

"Comrade Shelest?"

"Yes."

"This is Comrade Rodionov's secretariat. The chief wants to see you."

"When?"

"At once."

"At once? Why, what's the matter? Can you give me some hint what it's about?"

"I'm sorry, but I can tell you nothing more. The chief asked me to get hold of you and invite you down at once."

"But—" Shelest said worriedly, "I'd like to prepare for the interview. Do I have to bring any materials with me?"

"No, Comrade Rodionov said nothing about that. Will you please drive down at once. He's waiting."

Shelest went off. Everyone in the ADVI got to know at once that the director of the Institute had been called out to the A.F. Chief. Conjecture ran wild. Maybe it was about New Year bonuses, awards? But what awards could the Institute expect when it hadn't been able to create the so badly needed Soviet aircraft engine, when that ill-starred ADVI-100 had not yet been developed? Maybe a trip abroad? No, most likely some new assignment. But what?

The designers awaited the return of the director with interest. But after nearly two hours, when the working day was almost over another phone call came through from Rodionov's secretariat, asking all the leading designers of the Institute to come down immediately. Their names were given in a short list approved apparently by Rodionov himself.

"Let them have their identity cards with them," the secretary added. "Passes will be ready for all those comrades."

Berezhkov's name was in the list too.

This collective invitation was something new. It was quite a distance from the Institute to the A. P. Headquarters. They went by tram. Berezhkov's expectant feeling of the morning was forgotten, and he was now excited in real earnest. He stood in the tramcar, staring at the frost-painted window while nervous shivers ran through him. He was too excited to speak, and said nothing all the way.

2

In the outer office of the A.F. Chief the electric lights had been switched on. Dusk was falling.

Coming in with the rest of his colleagues, Berezhkov saw several designers from the Power-Plant Department of the Central Institute of Aviation. Ganshin was there too. Dressed as usual in a well-worn baggy jacket, with spectacles on his turned-up nose and his customary sceptical smile on his face, he perched most unprofessionally on the window-sill, answering questions which the designers of his department were asking him with a shrug of his shoulders.

Shelest sat in a corner of the sofa, looking obviously annoyed and offended. He had no smile for his pupils, the designers of the ADVI, when they trooped in. "Something wrong here," Berezhkov thought. He went up to Ganshin.

"Hullo. What's up? What have they called us out for?"

"High-powered engine," Ganshin answered laconically.

"What?"



"High-powered engine," Ganshin repeated and shrugged his shoulders again.

"Make yourself clear, can't you?" Berezhkov shouted. Rodionov's secretary shot a glance in his direction, but let this first offence pass without remark. Berezhkov, meanwhile, had gripped Ganshin's wrists and given them a shake, demanding

"Well, what is it?"

He recollected how, not so very long ago, he had stood thus in front of his friend, waiting for him to utter some marvellous, thrilling words. But he had failed him then.

"Ask Shelest," Ganshin said. "We both got it hot."

He jerked his thumb towards the massive door of Rodionov's private office. The secretary had just gone through it and closed it behind him. He reappeared a moment later, announcing, "Comrades, will you please come in."

Rodionov, tall, lean and erect in a dark-blue military tunic, rose to meet the incomers. He smiled a welcome and motioned them to the chairs.

"Well, well, sit down, comrades," he said cheerfully. "We're going to discuss something very important."

He paused and looked round, waiting until all had settled in their seats. Then he smiled again and repeated, "A very important thing!"

He sat down at his desk and, as was his custom, came down to business at once.

"It wasn't my intention to call you here today, comrades. But after having talked things over with your chiefs—comrades Shelest and Ganshin—I regret to say I had a feeling that they would not convey my words to you in the way I should want to have them conveyed."

He glanced at Shelest, then at Ganshin, and continued

"Excuse me for being so blunt. Plain speaking in such matters is essential if you are to make the supreme effort necessary for tackling the task which the Central Committee of the Party and our government have now set before us."

Rodionov paused again. He stared out over the heads of the audience, his brows contracted slightly in an effort of

concentration. After that brief pause, which seemed to give him a fuller grasp of what he wanted to say, he went on speaking, his body leaning slightly forward in his chair without losing its erectness. He reported that a hundred horse-power engine designed by Engineer Nikitin was being mastered at the Zadneprovye Works.

"We shall have those motors," he said. "The difficulties of batch production are being steadily overcome. But these low-powered engines do not solve the Air Fleet's problems. A small engine cannot power airplanes of this type."

He turned round and pointed to a silvery birdlike model with spread wings that stood out vividly over the now darkened window under the electric light.

"Not every great power has planes like that today," he continued. "But, as you all know, we are obliged to import the engines for them from abroad. Can you imagine what's going to happen in case of war?"

A volume of Lenin's works—the first edition—in light-brown cardboard covers lay on the desk in front of Rodionov. The binding was frayed at the edges and the book had a well-thumbed appearance. Two or three markers could be seen sticking out among the pages. Rodionov opened the book at one of them.

"'The war is inexorable,'" he read out distinctly, "'it puts the alternative with ruthless severity: either perish or overtake and outstrip the advanced countries *economically* as well. Perish or drive full steam ahead. That is the alternative with which history has confronted us.' There you are, comrades. We have no intention of perishing," Rodionov said with the shadow of a smile. "But then it's got to be full steam ahead."

He gave a brief account of a conference devoted to questions of aviation that had recently been held at the Central Committee of the Party.

"I am passing on to you the Party's directive, comrades—forward! We have to achieve a rate of development such as no other country has ever known, we must make a spurt that has never yet been heard of in the history of technique. Now what does that mean in reference to aviation, comrades, in reference to your tasks as designers of engines?"

He named the sum that had been earmarked for capital investments in the aircraft engine industry for the next year. It amounted to hundreds of millions of rubles in gold currency. Leaning slightly towards the table lamp under a green shade to consult his notebook, Rodionov read the figures out in a quiet voice. Berezhkov glanced to right and left. Yes, these were his associates, fellow designers, technically educated and technically minded men, and all of them had heard the words which he had just heard, words full of glamour and romance. "Perish or drive full steam ahead." They had been read out to them by that lean, grave man who carried himself so erectly, whose cheeks were slightly flushed and whose eyes were sparkling; he had read them out from his chair in a restrained level voice, almost without a single gesture. The dry detached manner with which he went on giving the figures of investments tended to stress the amazing, truly fantastic (as Berezhkov exclaimed in relating it) nature of the news which the designers had learned that evening in the private office of the Air Force Chief.

"The Party," Rodionov went on, "has set before us the task of creating a powerful Soviet aircraft engine, the most powerful engine in the world. We need a design, a project, and not just one, but several."

3

Rodionov paused again, as though to let this sink in. "I have called you here, comrades," he added, "simply to tell you this first-hand. I discussed it with your professors first, but unfortunately they doubt whether this big task is practicable. At least, that's how I understood them. Well, well." He glanced again at Shelest and Ganshin. Shelest said nothing, but Ganshin accepted the challenge.

"You asked me what I thought of it, Comrade Rodionov. As a specialist, an engineer—"

Rodionov frowned. He guessed from Ganshin's tone that the latter still persisted in his former opinion. The flush on his cheeks spread all over his face. It was a sign of

anger Ganshin nevertheless finished what he wanted to say

"As an engineer I felt bound to express my doubts. By setting ourselves such a difficult target to start with we may go wide of the mark, Comrade Rodionov."

Rodionov controlled himself with an effort. He said nothing. The flush came out in his cheeks again. But his tongue could be sharp even without him losing his temper.

"I'd hardly call you an engineer," he said in a quiet crushing tone. "If you told an engineer—now here's everything you need, here's an industrial plant with up-to-date machinery, the finest instruments and equipment, here are funds for all your production expenses, take it all and build the world's best engine—do you mean to say a real designer, a real engineer wouldn't jump at it with enthusiasm? Do you mean to tell me an engineer would turn down such a chance of showing what he can do?"

Berezhkov did not feel his own weight. His whole body tingled with excitement. "Take it all and do it!" Had he actually heard that, or was it all a dream? He looked round again, and saw Ganshin's snub-nosed face looking sullen and dogged. "What was it you called them—my dream projects?" he said to himself. This was certainly no dream. How queer that a single short hour could bring about such a reversal of attitudes. Only a few days ago Ganshin had scolded him for taking such a dismal view of life, saying, "Stop moping and moaning!" and now, who was moping?

Berezhkov now whole-heartedly accepted every word of Rodionov's. How wonderful it all was, what an amazing day!

Shelest got up

"Comrade Rodionov!" he said

The mobile swarthy face of the elderly professor, the teacher of all Russia's engine designers, was very grave.

"Comrade Rodionov. You have misunderstood us. We pointed out the difficulties, but—"

"Well, well."

"But who among us has not dreamt of such an engine? It will be the greatest honour to us if we, the staff of our institute—"

"Why the 'If'?"

Shelest stopped short. Rodionov looked stern—he was no lover of conditional clauses.

"It will be the greatest honour to the staff of the ADVI," Shelest repeated, "to submit to you, to lay down on this table, the design of the world's most powerful engine. And that day will certainly come, Comrade Rodionov!"

"That's better! Splendid. But don't be too long about it. You'll have serious rivals. I think Ganshin's group, too, will come up to scratch. And now we'll call it a day, comrades. There's no need for discussion. Put your wits to work, go ahead and tackle the job! I hope we'll be able to call a big conference soon, at which actual designs will be on the table for discussion. Well, well."

He stood up. The designers got up too.

"Well, well," he said, smiling. "I wish you a happy New Year, comrades! And good luck with the new engine!"

4

Rodionov stepped from behind his desk and went up to Ganshin.

"Why so glum, Ganshin? What do you say to taking a run in the aerostelgh tomorrow to celebrate the New Year? It used to be a craze of yours, I believe? Or have you written yourself off among the oldsters? Have you cooled off?"

"No, I take part in all the sleigh runs."

"Is it in working order?"

"Yes."

"Well, if Ganshin declares a thing in order, then."

Rodionov laughed, at a loss for words.

"I'll have it ready for you if you like," Ganshin said as gloomily as ever.

"Then let's take a run down to the Volga tomorrow and back again."

"The Volga?"

"Yes. We'll have a look at the site for a new engine works. Well, what do you say to that? A commission went out there yesterday to select it, and you and I will pay them a surprise visit. Perhaps the ADVI will keep us company in another sleigh? What do you say, Shelest?"

"With pleasure," the Professor answered. "Will you drive, Berezhkov?"

Berezhkov did not answer. He was strangely inattentive, and had hardly heard any of the conversation. His mind was a whirling confusion of engines, some of them taken to pieces higgledy-piggledy, with the pieces dropping into ridiculous, misshapen patterns, while he stood staring at it all dazedly, as if it were something outside himself.

"Berezhkov!" Shelest called again.

"Eh?"

"Will you drive the sleigh tomorrow? He's our champion aerosleigh driver, Comrade Rodionov."

"I know," Rodionov said. "We're old acquaintances. We've been together"—he screwed up his left eye as if he were sighting a rifle, while his right regarded Berezhkov with a gay twinkle—"we've been together in some tight corners."

Berezhkov was silent. Only a flush betrayed his emotions. Yes, they had done some fighting together. Rodionov hadn't forgotten him, hadn't forgotten their meeting on the Baltic coast that night of the assault of Kronstadt. Berezhkov remembered it too. That tense zero-hour excitement, that surge of emotion which had flooded his being on that memorable night in March so many years ago, was oddly akin to his present state of feelings. He could not put it into words. He consented to drive the aerosleigh and take part in tomorrow's trip to the Volga.

"Good," said Rodionov. "We start from Lefortovo Platz then, tomorrow at nine a.m. No objections?"

"I would suggest ten o'clock, Comrade Rodionov," Shelest said. "Don't forget it's New Year's Eve today."

"I'm not forgetting that. You don't imagine I'm going to have my New Year's Eve party here in the office, do you?"

If it weren't for that, we'd start out at the peep of dawn. So, it's nine o'clock then. Well, comrades, have a good time. Enjoy yourselves."

The designers huddled in the doorway and filed out of the room one by one.

"This is a big thing," Shelest said when the door had closed behind them.

He, too, was excited and preoccupied, apparently thinking about the new engine. Not a trace of his former ill-humour remained.

"I say, Berezhkov," he said, "will you please come down to the garage tomorrow morning at seven sharp? It's like old Compass days, isn't it?"

"Yes," Berezhkov answered absently. "All right, Professor, I'll be there at seven."

His mind was running on some mysterious tack of its own, which he himself could not yet fathom. A faint smile oddly out of keeping with the drift of the conversation flitted across his face.

"Yes, of course. I'll be there, Professor."

## 5

From the A. F. Headquarters in Varvarka, Berezhkov and Ganshin walked down towards Red Square through the back streets. A gentle wind was blowing and snow was falling. Many windows were brightly lit up, and the heavy flakes could be seen flying and whirling slantwise. Little swirls spun up from the white roadway and the white pavement and flung powdered snow into their faces.

Berezhkov slipped his arm through Ganshin's. As though by tacit consent the friends said not a word about the conference or engines. Berezhkov did not feel like discussing the subject. Some instinct, as it were, made him want to guard the secret work that was going on within him.

He filled his lungs joyously with the sweet keen air. The pavement felt springy underfoot. Where was the depression he had been a prey to for so long?

In Ilyinka, a busy street, the gay holiday mood was at once in evidence. Men and women, talking and laughing, hurried along carrying parcels—last-minute purchases for the festal board.

"I say, it's past nine already," Ganshin said. "Come straight to my place."

"But I've got to change!"

"Nonsense. You'll explain the emergency. Suddenly called out to Rodionov. And tomorrow's sleigh trip in prospect, too."

"Who are you expecting?"

Ganshin named several common acquaintances.

"I also promised you a surprise. You'll get it."

"Who is it? A he or a she?"

"I'll tell you nothing. It's a surprise."

"If it's a she," Berezhkov began, stopping in the middle of the pavement, "then it's no go, old chap. I'll rush home to change."

"Come on!" Ganshin said, drawing him on. "I have a feeling that you'll fascinate everyone this evening just as you are."

"D'you know what, Ganshin," Berezhkov said.

A strange dreamy smile flitted across his face once more.

"D'you know, I want to be fascinated myself. Have you ever experienced it? It isn't really love, but a presentiment of love, a feeling that it's going to get you."

"Yes, I've had it."

Suddenly Berezhkov recited, " 'Mamma! Thy son is beautifully ill. ' "

"What's that? Where's that from?"

" 'Mamma! Thy son is beautifully ill,' " Berezhkov went on, ignoring the question. "His heart is afire. Tell sisters Lyuda and Olya there is no escape for him. ' "

"What is it?" Ganshin demanded.

"Mayakovsky 'A Cloud In Pants.' A gripping thing."

" 'Beautifully ill,' " Ganshin said ironically. "Makes no sense to me. Mere verblage."

"Dry-as-dust!" Berezhkov shouted at him.



Whether he chattered with his friend or was silent, his brain, in spite of himself, went on with its secret work. Now and again some new combination, some new construction seemed to loom only to break up the moment he tried to look at it closer. The Wright engine haunted him, he couldn't get it out of his mind. It was maddening! The damned thing stood in the way of something, some vague half-formed thoughts of his own that glimmered in the back of his mind.

Red Square swept into view at the top of the street. The friends saw straight before them the dark battlements of the Kremlin with the silhouettes of its towers, still topped by the double-headed eagles, looming through the flying snow. Above the Kremlin, brightly lit up from below, a red flag fluttered in the breeze. The lamps running down the length of the Trade Row building opposite the Kremlin threw cones of light on the square. Shafts of whirling snow-flakes leapt out of the dusk in the dazzling headlights of passing cars. In that snowstorm, in that eerie light of a Moscow wintry night, the vast square, sloping at either side, looked convex and spheroidal along the Kremlin wall, like the segment of some gigantic globe.

Berezhkov stopped again and raised a hand in a woolen knitted glove.

"What's the matter?" Ganshin asked.

"Wait a minute. Let's stand here."

"What for?"

Berezhkov leaned over mysteriously towards his friend.

"Can't you feel us rushing through cosmic space?" he said in a hushed voice.

Ganshin grinned.

"Dreaming again. Oh, come along."

"Wait a minute. Can't you hear the swish of it?"

"I can't hear anything."

"Shut up, you prosy beggar."

They proceeded on their way. Berezhkov stepped out lightly, enjoying the snowstorm. The dim shapes of engines began to loom once more in the semi-gloom of imagination as if snatched out by the play of wavering

headlights. Walking arm in arm with his friend, Berezhkov saw nothing but what his mind was now working on.

"I think you're on the right track," Ganshin suddenly said.

Berezhkov looked surprised.

"What do you mean?"

"Don't you know? Don't you remember what you were muttering just now?"

"Was I muttering? I don't remember, honestly. What was it—tell me."

He shook Ganshin by the shoulders.

"Let me go. I'll tell you."

"Well, what?"

"You said, 'that damned Wright.'"

"So you think I'm on the right track?" Berezhkov said.

Ganshin nodded. They walked on arm in arm.

"You're not such a prosy beggar after all," Berezhkov said.

Again, as if by tacit consent, not a word about the engine was said for the rest of the way.

6

Presently our friends reached their destination. Ganshin opened the door with his latchkey and invited his guest into the flat.

Midnight was a long way off yet. It was only a few minutes past ten. Berezhkov's cheeks and hands were nipped red by the frost, the keen tang of which still hung about him. He bowed his greetings, and murmured compliments to the ladies while his eyes searched the room as if looking for somebody. He was rather disappointed. Of course, she couldn't possibly be here—the girl he had thought of that morning when tearing off the sheet of the calendar.

He was wondering what Ganshin's surprise could be, when a voice from the other room called him, "Alexell!"

It was a remarkably familiar, husky voice. Berezhkov whirled round. Well I never! If it wasn't Ladoshnikov! Berezhkov rushed up to his friend, whom he had not seen for several years--the "Leningrader," as he had now come to be called.

Ladoshnikov was standing in a corner near Ganshin's desk, which had been cleared that day of all its scientific accessories, and covered, as was the dining-table, with a dazzling white table-cloth laid with covers and uncorked bottles. Ladoshnikov's towering figure seemed to emphasize the smallness of the room. He made it look crowded. *The years he had spent in Leningrad had wrought some change in his appearance.* Apparently he had discarded his once favourite high-boots and Russian blouses. His hair was now neatly trimmed, and he wore a suit of excellent, if not dandyish, cut. For all that he was still the old Ladoshnikov. Even the same old habit of looking out from under bushy, overhanging brows in a scowling sort of way. He looked at the approaching Berezhkov and smiled. He stepped forward to meet him, slightly brushing against the table and setting the bottles swaying, and gave his friend, his brother-in-arms, the inventor of the Adros, a powerful hug, then held him away at arm's length, and said, "You've grown younger, old chap."

That evening, in fact, Berezhkov had about him a shining youthful ardour. He was unable to quench the sparkle of his greenish eyes, which seemed to have grown brighter, that innate smile of his that came so irresistibly to his face. He recognized the old Ladoshnikov in that exclamation. The latter saw everything without seeming to notice things. Berezhkov forgot everything else around him and could not tear his eyes away from his friend. The adoration of his youth still had a strong hold upon his heart. With tenderness he discovered new traits in Ladoshnikov. He seemed to have got rid of his former reserve and sullen shyness. *He would never have hugged Berezhkov before with such natural unconstraint.* His smile, too, was easier and fuller, one might say, "happier." Indeed, this man, this new Ladoshnikov had known the joy of creative work, of success.

Ganshin came up. He gave Berezhkov a punch in the ribs.

"Well, how do you like my surprise?"

Then Ladoshnikov turned to Berezhkov.

"Rumours reached me in Leningrad that you were turning old and sour. You don't look it, though."

"And I don't feel it either. We're going out on a run tomorrow."

"In the aerostelghs?"

"You've guessed it. Joining us?"

"Is Ganshin going too?"

"Not only Ganshin, but Shelest himself. Practically the whole Compass staff will be there in a body."

"Sounds very tempting. Where are you going?"

Berezhkov lowered his voice—it was hardly judicious to make a public announcement of tomorrow's route—and answered.

"The Volga. To visit the site of a new engine plant."

Suddenly a shadow crossed Ladoshnikov's lean face. For a moment the old sullen look came back into it. At any other time Berezhkov would not have detected that beetling shadow, but with the quickened senses of one in love, he caught it at once.

"What's the matter, Mikhail?"

After a moment's hesitation Ladoshnikov growled:

"This has been a day of troubles for me."

"What's the matter?"

"I asked for something in connection with my work, but nothing came of it. They refused me."

"What was it?"

"An important thing. It concerns the fate of one of my machines."

"Which one? The LAD-8?"

Ladoshnikov nodded. Berezhkov did not ask him any more questions, but quickly slipped his arm through his and drew him out into the passage for a private talk. But even there, behind the heap of fur coats and caps—some of which were fresh from the frost—they discovered a young couple. Their privacy, however, was illusory, for an elderly military man stood in the passage,

smoking a cigarette. While Berezhkov was looking round for some secluded nook, the front-door bell rang sharply. Guests had arrived to some other tenants of the flat. Damn it, you couldn't have a talk here, with all those tenants and their guests prowling about the place. An idea struck Berezhkov. Knowing the lay-out of the flat—he had been at the Ganshins' housewarming—he drew his friend out on to the backstairs landing.

The wan light of a wintry moonlit night filtered through a small frost-patterned window a little higher up. The two designers, all by themselves at last, went up to the landing where the window was. Ladoshnikov's profile stood out against the faint light as if it were cut out of some dark-coloured cardboard. Berezhkov saw his bulging forehead, the strong ridge of his brows, the firm, energetic mouth. Here, on the quiet staircase, Ladoshnikov briefly told his friend about what he had called "a day of troubles." On arriving that morning he had gone to A. F. Headquarters where he was immediately received by Rodionov. The latter told him that the government had decided not to buy the Melbach designs, but to build a plant for manufacturing a powerful aircraft engine of our own design. But there was no such engine yet. There wasn't even a design idea for it.

"Who knows," Ladoshnikov continued, "what's going to happen to the LAD-8 now. Quantity production is impossible until we have an engine."

Berezhkov tried hard to look sympathetic, but he just couldn't. That smile of his would keep cropping up. All kinds of weird motors, dim grotesque medleys of various engines were passing before his mind's eye again.

He interrupted Ladoshnikov and began telling him fervidly about what had taken place that evening in Rodionov's office.

"We were told—either death or full steam ahead. Lenin wrote that."

"I know."

"Yet you worry about the Melbach."

Ladoshnikov paused before answering:

"A curious duel, ours is. My tune's a sad one."

"You'll be singing a gay one yell Take that from me. Full steam ahead! That's what history dictates. Do you understand?"

"You don't seem to feel the cold at all, Alexei."

"I don't. Honestly, I don't."

"I'm freezing, I must say"

"Then let's go in. I'm going to amuse the house to-night. I'll cheer you up too"

7

A little later Berezhkov was telling the guests the story of the famous aerosleigh trip

While certain predilections and qualities of Berezhkov's may have been regarded somewhat sceptically in this house, his reputation as a story-teller had always stood high.

"We went out into the frost after dinner as cheerful as can be," he related. "We started to crank up, but there was nothing doing. It's simply astonishing—but every important incident in my life has always found me in some acutely embarrassing situation."

He recited the story in all its details with innate artistry and ardour, as if he were telling it for the first time. As before, out in the street, he was joyously aware of having found himself again. The minute hand still had to go all round the dial before the clock struck twelve and ushered in the New Year. According to custom the first glass was to be raised exactly at midnight, but Berezhkov, as often happened with him, was already intoxicated without wine.

He finished his story with a few picturesque touches, but everyone wanted to hear more, and begged him to go on.

"Tell us something more."

Berezhkov needed no urging. But what should he tell them about? He appealed to Ladoshnikov for a suggestion.

"Mikhail! What shall I talk about?"

Ladoshnikov spread his hands.

"If you must tell stories, you might as well tell us about what was most important in your life—the most important event in your life, I mean."

"The most important? Let me see."

Berezhkov smiled. It struck him that perhaps the most important event of his life had taken place that very day, from the moment he and his Institute colleagues had been summoned before the Air Force Chief. For a moment his face with its half-childish, half-mischievous smile, its narrowed twinkling little eyes underwent a sudden transformation oddly out of keeping with his jocular tone. It took on a queer, absent look. But this lasted only a moment. Then he exclaimed:

"I have it! I've recollected an event of colossal importance! But . . ."

He paused intriguingly and let his eye run round the room.

"But you will never guess what it is! My adventures are known to many of you. Try and guess what I am going to tell you about."

Various guesses were made, but Berezhkov invariably answered with a brief "no."

"I'll have a try," Ganshin said. "Here, let me look into your eyes."

"By all means."

Berezhkov readily offered his face for inspection.

"I'll tell you what it is," Ganshin said. "It's another adventure of yours in the aerosleigh."

"Maybe. What next?"

"It's the story of your water devil—"

"That'll do, Ganshin! You'll spoil the whole thing for me. How did you—"

"Yes, I think you're on the right track."

"What track?"

Berezhkov was genuinely puzzled. He had intended to entertain the company with a magnificent tale with an amusing ending and had been looking forward to the laughter it would be greeted with. And yet beneath all this was a hazy undercurrent of thought in which all kinds of fantastic lay-outs came and went, materialized

and melted away without any apparent bearing on all this New Year chatter, these New Year tales. What could Ganshin have meant?

"Well, friends," Berezhkov began, "before the New Year comes in we still have. . ."

The clock hung on the wall in the other room. He pulled out his watch. His story was all set in his mind, ready to come off his tongue. Then, all of a sudden his hand stood arrested. His ears began to tingle. He did not finish the sentence, did not look at his watch, or, if he did, saw nothing but a blank dial. The mischievous smile had gone. He wanted to shout out, but said quietly instead. "I'm sorry, but I have to go."

With flaming ears he ran out into the passage with Ganshin at his heels. His sister Masha hurried out too.

"What's the matter? Where are you going?"

"I've found it, Ganshin, I've found it!" Berezhkov yelled.

"Wait a minute, where are you going?"

"I'm going home to draw! I'm going to shut myself up."

"Hold on! That's not your cap!"

"Isn't it? Where's mine?"

"Wait a minute!" Ganshin said, clutching his friend by the button of his coat. "Don't forget you're driving the aerosleigh tomorrow. You can't let your people down like this."

"Think of something, Ganshin. 'Phone up Sbelest, tell him I've suddenly fallen ill or something."

"I think you *are* ill."

"I am. Beautifully ill. D'you understand? Let me go!"

He wrenched himself free and ran towards the door. His sister shouted:

"Alexei, shall I come, too? Do you want anything?"

"No. Just a cushion over the telephone. No, two cushions."

He rushed out on to the landing with Ladoshnikov's deep bass rumbling behind him.

"You'd better run after him, Masha. We leave that crazy fellow to your care."



"What was it you were going to tell them?" I asked  
 "And what made you rush out?"

"I wanted to tell them the story of the water-tank."

"What water-tank?"

"Didn't I tell you about it?"

"No"

"I wonder how it could have slipped my mind. Why, it was a colossal event in my life."

And Berezhkov told me the story he had not had a chance to tell at Ganshin's party

"Ever since that night when we failed to start up the aerosleigh engine, I had been constantly thinking how to invent some device for quickly warming up an engine under any emergency and in the coldest frost. I soon had a chance of realizing that idea. There was an Aerosleigh Department at the ADVI, and I began to build a sleigh of my own design there without dropping any of the other numerous jobs I was engaged in at the Institute. I remember with what delight I drew the beautiful streamlined forms of it, trying to pull all the ugly jutting parts into a single beautifully curved line. Then came the turn for my little invention. It was quite a simple thing, which had existed at least a hundred years before my time, namely, a samovar. Yes, I decided to mount a samovar into my sleigh, or rather a water-tank working on the principle of the samovar. A bundle of firewood, a few dry birch chocks, for which you can always find room under the seat, and there you have the makings with which to boil up water and quickly warm up the engine in any snowstorm or in any snowy deserted field. In my drawing the tank and its pipes formed a pleasant wavy line in the general contour of the sleigh.

"At last the sleigh was built. It passed all tests splendidly. A Moscow-Yaroslavl aerosleigh race was announced. Naturally, I was one of the contestants. My novelty caused quite a sensation at the starting post. Everyone critically examined my 'samovared' sleigh, cracked jokes at my expense, and laughingly predicted

all kinds of trouble. I smiled modestly and said nothing. A little while later I was racing in the lead across the shining frozen snow-crust. I came in first in Yaroslavl. After passing the finish line I made a sharp turn and, amid a cloud of snow dust, tooled back to the line where they were waiting for the victor. I opened the door. A lovely girl gave me a bunch of flowers. No, two bunches. She awarded me with the sweetest of smiles. And suddenly —

At this point Berezhkov laughed.

"For Ganshin's guests," he said, "I would probably have drawn out the story and put some gripping frills for sensational effect. But I'll give you the effect without the frills. Yaroslavl, the finish, the cheering crowds, the bunch of flowers and all the rest of it were still a long way off, something I saw only in my fancy as I sat at the controls of my rushing sleigh. All of a sudden I was almost flung out of my seat. Crack! There was an ominous splintering sound. A ditch! I hadn't noticed it. But after the jolt the sleigh glided on with only a slight loss of speed. The engine throbbed smoothly. I listened to it for about a minute. No harm done, it seemed. I carefully put on speed. The aerosleigh spurted forward, then suddenly something started rattling and grating against the plating. What's that? The sleigh had run quite smoothly after the jolt. What could that be banging there? My heart sank as I guessed what it was and put on the brakes. The sleigh stopped, and I got out. Just as I thought! That lovely water-tank of mine had been ripped away by the blow. The torn pipes dangled down the sides of the sleigh. With a curse I got out the tool bag and started to unscrew the wretched dragging ruins of my invention. The other contestants raced past me, jeering.

"It was here," Berezhkov said, raising a significant forefinger, "it was here that the most colossal event in my life took place. I suddenly understood what rigidity meant. 'Understood' is hardly the word, though. I had known it before from the textbooks I had read, and had heard a lot about it from Professor Shelest, who constantly developed in his books the idea of rigidity in air-

craft engine construction and brought us, his pupils, up on that principle. But it was out here in the snowy waste, cursing and fuming, that I first *felt* that principle.

"Ever since then, no matter what construction I was designing, I would always say to myself, 'Berezhkov, remember, that water-tank was not rigidly constructed' I secretly believed there wasn't another designer in the world who had had the principle of rigidity brought home to him with such force as I had had. For your benefit I suppose I ought to explain that what we mean by rigid construction and stiffening is when all parts of an engine are absolutely shock-proof, as if cast in a single piece. Don't forget, an internal combustion engine is constantly subject to heavy stresses from shock loads and explosions in the cylinders. It is a simple thing to increase the force of these explosions, but that would mean shaking the construction loose. The various parts of it would crack up and fall away under a shock, like my water-tank did.

"The American Wright engine had achieved the then highest degree of rigidity in the cylinder bank, that is, as I have already told you, a single casting containing the cylinders. No wonder that Wright haunted me when I came away from the conference at the A. F. Headquarters with Ganshin on New Year's Eve.

"Afterwards, when I was entertaining Ganshin's guests with stories and decided to give a comic sketch of the water-tank incident, the new construction burst upon my mind. I saw a way of greatly increasing the rigidity of the whole engine and not just the cylinder bank, that is, I saw at last, as in a flash of lightning, the construction of the world's most powerful engine, which existed yet nowhere outside my imagination.

"I dashed out into the passage like a madman. I forgot all about the New Year and the next day's sleigh run, and strode home through Moscow, blind to all the world, with one idea hammering in my brain and my hand itching for pencil and drawing paper.

"So there you are, my friend. See what things sometimes happen on New Year's Eve?"

For three days round the clock Berezhkov sat indoors, seeing no one, answering no telephone calls and sustaining life mainly by strong coffee the while he drew his design in various sections and views on large sheets of drawing paper the size of his whole desk.

Sometimes, without undressing, he would doze off for two or three hours on the sofa but even then designs, crazily distorted alternating with amazingly clear ones, would float maddeningly before his eyes.

On the morning of January the fourth, after an absence of three days, he arrived at the office in a lorry. The lorry drove up to the main entrance of the Institute. In the body stood Berezhkov, carefully supporting two light plywood shields neatly wrapped together in newspapers and tied with string. He had not forgotten, in his creative throes, to tell his sister to get the shields made and now his designs were tacked to them for demonstration. Berezhkov always liked to finish off his things with meticulous care and exhibit them with brilliant effect.

Haggard, with the yellow shadows of fatigue on his face, which not even the frost had been able to chase away insensible alike to the frost and fatigue, but, on the contrary, strung to a high pitch of excitement, Berezhkov, clad in a short fur coat and cap and felt high boots, sprang down lightly off the lorry, carefully took the shields down, and paid the driver.

Just then a group of his colleagues came towards the entrance, among them Professor Nieland, the chief of the Institute's Calculating Bureau—a rather difficult man, who ever since the nut-bolt incident years ago had been unable to overcome his dislike for Berezhkov.

"Good morning, Professor," Berezhkov cried. "Happy New Year!"

"Good morning. Feeling better? I'd button up that collar if I were you. The flu gives such nasty complications nowadays. You'd better be careful." He glanced at Berezhkov's queer burden. "What's that?"

"Will you please hold the door open," Berezhkov said.

Nieland obligingly opened the door and let Berezhkov in first. They made for the cloak-room barrier.

"What is it you have there?" Nieland repeated.

"A modest work of mine," Berezhkov answered mysteriously. "You'll hear about it today."

"I don't understand. Weren't you ill these last few days?"

Berezhkov was in a mischievous mood. He leaned over to Nieland and whispered confidentially into his ear, "New Year hang-over."

"What, four days?"

"Yes. Only came round this morning."

"Are you quite sure you did?"

Berezhkov was unable to cope with the expanding grin, but only Nieland's back was there to receive it.

Berezhkov carried his awkward burden upstairs, where the director's office and the main drawing room were situated. On the landing he saw a notice with a large heading: "Attention!" Most of the staff walked past it without stopping to read it, evidently they had done so yesterday or the day before. Berezhkov leaned his drawings against the wall and began to read it. It was a staffing order signed by Shelest. Berezhkov ran through it, and recognized words which he and the other designers had heard from Rodionov on New Year's Eve.

The order spoke about the problems of industrialization, and the great transformation of the whole country, about the unparalleled rate of development that was required in order to overtake and surpass the capitalist countries in technical equipment. The passage from Lenin, which had recently made such a profound impression on Berezhkov, was quoted too: "Perish or drive full steam ahead." Although it was not new to him, it stirred him once again.

Then followed a paragraph dealing with aviation. "Our country," Berezhkov read, "needs a big and powerful Air Fleet. We, the staff of the ADVI, have now received from the government an assignment of historical significance, to design an aircraft engine of 800-850 h.p.

that is, an engine that will beat the best foreign models in power and performance."

Berezhkov glanced at his shields, and wanted to smile, but his lips suddenly quivered. The nervous tension of the last three days caused by overwork and lack of sleep was now telling. He tightened his jaws. Facing that sheet of paper on the wall, Berezhkov realized anew, as it were, the importance of what he had done.

The order concluded with the announcement that, in view of the special importance and urgency of the assignment a Work Supervisory Commission was formed under Shelest's chairmanship. The other members of the commission included academicians and professors, Nieland among them. Berezhkov did not find his own name in the list—he was merely one of the Institute's senior designers and had no academic title at that time. The first meeting to discuss the basic principles of the project was fixed for the following week. It was announced that after the report the meeting would be thrown open for a wide discussion to which all staff members were invited. At this Berezhkov smiled and winked an eye at the honorific list.

10

Someone came up noiselessly from behind and put his arm round Berezhkov. He turned and saw Shelest.

"What was the matter with you?" his chief asked kindly. "You don't look well. Hadn't you better stay in bed another day or two?"

"No, thank you."

"There, I knew you'd be offended with me."

"Why?"

"My dear boy, don't be diplomatic. You read that order, of course."

"I did."

"Don't be offended. The commission, as you see, has been made up exclusively of academicians and professors."

It has to be an authoritative body for the sake of the outside world. But here, inside, I count chiefly on you. I want you to take an active part in this work from the very beginning. After a time—I give you my word for it—we shall formally make you a member of the commission. So please don't sulk. Prepare your points and ideas for the meeting."

"I have run out of ideas, Professor."

"There, you are offended after all."

"I'm not. I had some ideas four days ago, when I think I grasped the kind of construction you'd want to take as a basis."

"Yes, I've been thinking about that. Don't you think that our future lay-out should—come into my room, we'll talk it over—that our lay-out should be based on the Wright?"

"It's been done already, Professor."

"What's been done?"

"I've brought you my design."

Shelest looked closely into Berezhkov's greenish eyes.

"What design?" he said. "That of a high-powered engine?"

"Yes."

"Then where is it?"

"Here it is!" Berezhkov said, giving the plywood a flick.

"Then why don't you show it?"

"I'm just dying to. I'd like them all to see it, if you don't mind."

"And what if they tear it to pieces?"

"I'm prepared to fight for it."

"All right. Come into the hall. We'll have a look at it, do some criticizing."

Berezhkov entered the drawing room with his plywood sheets, followed by Shelest. The director stood in the doorway, leaning against the doorpost with his hands in his pockets, outwardly calm.

Berezhkov's appearance in the main drawing hall of the Institute with two plywood sheets which he had brought down in a lorry is still a legend within the walls of the ADVI

He was so excited that he fumbled about with the string, unable to untie it or tear it. One of the designers sitting close by handed him a penknife. The cut string fell away. As for the newspaper wrappings, Berezhkov simply tore them off. Various designs of foreign-made engines, which were then being studied and investigated at the Institute, hung on the walls. Without more ado, Berezhkov hung his boards up for general survey over two such designs. Sheets of drawing paper were tacked to them showing a design in longitudinal and lateral sections. The heading read "Eight-hundred H.P. Aircraft Engine. Line Lay-out by Designer A. Berezhkov."

He looked round to find that everyone had dropped his work, Berezhkov's silent impetuosity had attracted all eyes, two or three designers had left their desks and come up to look at the drawings. In a distant corner Berezhkov saw Nieland, his face flushed with annoyance. The latter got up and strode over to Shelest.

"What... what's the meaning of this?" he got out with difficulty.

"It's the design of a super-powered engine, as far as I can judge," Shelest answered.

"But I thought the commission was going to work that out. On what grounds does he do it?"

"Would you believe it," Berezhkov said, "his indignation was so great that he couldn't pronounce my name. My action struck him as being a sort of mean and underhand trick, you know. They had only just formed a commission, mapped out a plan of action, drafted agendas for the meetings, at which serious reports were to be made and serious discussions held about the basic principles of the project, and here, all of a sudden, up jumps this Jack-in-the-box of a Berezhkov, who isn't even a member of the commission, and hangs his designs up on the wall.



Scandalous! Who gave him the right? It was a scene, I tell you!"

Berezhkov acted the parts with humour and skill—himself demure and meek as a lamb, Shelest, now sitting on a stool at someone's desk, one leg crossed over the other, gazing at the drawings, Nieland, a picture of indignation, shouting, "Disorganization! Commission! Commission!"

"A humorous twinkle came into Shelest's eye," Berezhkov added "He told Nieland, 'Can't be helped, my dear man Act of God. We're obliged to reckon with this sort of er natural phenomenon. However, let us examine this design. What is your opinion of it, Nieland?'"

12

After Shelest had, with his customary tact, somewhat pacified Nieland, they both turned their attention to my design, Berezhkov continued I was eager to hear their verdict. Nieland drilled my lay-out with an inquisitorial eye. Let him find a single vulnerable point in it if he could! I stood with my back to the drawings, but I had a clear mental vision of them. I looked at them with the eyes of Nieland, took fresh stock of the thing, as it were, went over every detail of it. No, it was absolutely watertight, unassailable. The conception as a whole and every separate solution were based on the achievements of world engineering, and were a refinement of existing forms of proved merit. Schooled by Shelest, I had not departed a single step anywhere from his precepts.

"What do you say?" Shelest repeated. "What's your opinion, Nieland?"

"So, so," Nieland muttered at length.

So, so! Hurrah! So he had nothing to pick at. But he added acidly:

"Nothing here which we haven't seen already in the Wright."

"I beg your pardon," I said humbly, "but you are mistaken. Where have you seen a Wright engine of eight hundred horse-power?"

Nieland vouchsafed no answer.

The Wright designer," I said, "didn't realize the latent possibilities of his own engine. What I did was to develop them. That's all."

For the purpose of your book, Berezhkov went on, I'd like to clarify one or two points of a professional nature. My specialty, as you know, is general lay-out. I have a natural aptitude for visualizing an engine as a whole, for making the preliminary design of a thing. Not every professional designer possesses that faculty. In modern drawing offices—motor-car engineering, say—you will have a man who specializes in back axles. He works on this one detail of the motor car for years and refines it from model to model. Then you will have valve specialists, gear-box specialists, and so on. As for me, I always had a hankering for general lay-out, the general conception of the thing.

At the same time I saw nothing reprehensible in using elements from existing engines which I felt to have a future, and bringing out their progressive tendency in my design as I saw it. The dream project, as you know, had always attracted me, but I could, when I had to, take a common-sense practical view of things. On this occasion, too, my new lay-out contained no fantastic or new-fangled ideas. My schooling with Shelest had trained my mind to reason thus: You've got to begin somewhere! Our country does not yet have a single aircraft engine of its own manufacture. That means we've got to learn from the foreigners. Or, putting it more crudely, pass through the imitative stage of creative engineering. I understood that such a conception imposed a check and restriction on the imagination, but I accepted the situation with open eyes. But then, if any critic, designer or production man, argued that such a thing couldn't be engineered or wouldn't work, I could turn round and tell him: but here's the prototype. It has stood the test of practice, it works.

As you will see further, this conception did not help us either; we again failed to achieve a working engine, suffered another cruel defeat.

But at that time, in the drawing room of the Institute, I had unbounded faith in my design.

13

At that time, in the drawing room of the Institute, Berezhkov fully believed in his project.

Everyone had come up to look at the drawings. The lay-out was criticized. Berezhkov parried the attacks. In disputes of this kind he always resorted to pencil and paper, expressed his ideas in drawings and sketches which he dashed off as he went along. Now, too, he felt impelled to draw, and was about to step towards the blackboard, when Shelest said:

"Here, you youngsters, drag the thing over here."

Several young engineers rushed over to the blackboard and moved it up in the twinkling of an eye. With a duster in one hand and a stick of chalk in the other, Berezhkov defended his work, now and then making witty thrusts at his opponents to which the hall responded with laughter and a hum of approval. He quickly threw off his chalk-smearing jacket and rolled up the sleeves of his light-blue shirt.

Shelest sat on a high stool at one of the drawing desks, following the free and rather disorderly dispute with obvious pleasure. All these men were his pupils, graduates of his school, who had adopted his system of scientific and technical thinking. How quickly that scamp had grasped and concretized the ideas that had been stirring in his own mind! How fervently that limping dandy with the chalk-smearing face was defending the motto, which Shelest had been dinning into them all, day in, day out, year after year: "Nothing fantastic, if you want to create anything."

At the height of the dispute someone suddenly started banging on the side door. This door led by a short cut to the Institute's workshops and testing station. It was usually kept locked in order not to have people walk through the drawing room. The banging, evidently the

work of more than one pair of fists, was so energetic, that everyone in the room looked round

"Who's there?"

It turned out to be graduating students specializing in aircraft engines who were taking a course of practical studies at the ADVI. On hearing that the design of an eight hundred horse power engine had been hung up in the main hall and that a spontaneous dispute had sprung up there they were eager to take part in the proceedings.

"You can't come in!" Nieland barked. "This door doesn't open."

"That was Nieland all over," Berezhkov remarked, "the true Nieland pedantism! 'This door doesn't open'! But the students put their shoulders to it and—can you imagine?—broke it down!"

Berezhkov had dropped into his usual style of narrative, using pet phrases and gesticulating, with flashing eyes as if he could see the vast surging crowd that was fighting to see his drawings.

"Broke it down?" I queried.

"Well let's put it this way," he yielded readily. "The door flew open with a bang. The students burst into the hall and first among them was Nikitin that Andrei Nikitin who has already made brief appearances in this story, now with a military Papakha on his head, now in scarlet football shirt and shorts at the Zadneprovye stadium. For the moment, I remember I was surprised. Surely this solid-looking dignified man had not put his broad shoulder to that door too? Among the gate-crashers I also saw Fyodor."

"Fyodor? Who's that? You don't mean Nedolya?"

"That's the one! You probably remember how he disowned me during my flour-mill escapade? After that we met again. But let me get my breath. I'll tell you all about it presently."

After cooling towards his former idol, towards Berezhkov the flour-miller, Nedolya had travelled a road which thousands of his coevals had followed. He worked as a

fitter at a big plant, studied for two years in evening classes, then entered the preparatory department of the Moscow School of Engineering, which was then flooded by a wave of workers.

One day Berezhkov ran into him in the street. Fyodor was now a student of the Mechanical Department, and Berezhkov was no longer proprietor of a mill nor a vagrant inventor and free lance, but a member of the staff of an aircraft-engine research institute, senior design engineer. Berezhkov immediately recognized his old friend's lank ungainly figure. In place of the greenish puttees, which he had not discarded for years, he now wore civilian trousers. The friends spent the evening together. Berezhkov let his imagination run wild again and spoke about the tremendous thing he was going to create. But two more years passed and he created nothing, nothing that was workable.

In his last year Nedolya, with a group of other graduating students, was sent to the ADVI for a course of practical studies. He held aloof from Berezhkov with the modesty of a mere student towards a master, but when they chanced to meet Berezhkov always felt upon himself his eager expectant look, as if he were trying to guess whether this man, the idol of his youth, would really create something wonderful or not. Was it worth his while waiting?

And now, when Nedolya burst into the main hall of the Institute with his fellow-students, the first thing he saw was Berezhkov standing there flushed with battle, jacketless, the sleeves of his blue shirt rolled back belligerently, his excited face, turned towards the hall, smeared with chalk; he read the inscription on the drawing "Line Layout by Designer A. Berezhkov" and his own face suddenly flushed. Was this, at long last, the minute he had been looking forward to for so long, was this the tremendous thing Berezhkov had at last created?

Nedolya stood craning his neck at the back of the crowd, but Berezhkov instantly noticed his fair head and shining eyes.

"Comrades!" Berezhkov said, in all that hall seeing distinctly only Nedolya's eyes. "Comrades, this is not yet it with a capital I."

He pointed to the drawings with a hand which still held the duster, and dropping the thread of his argument for a moment he turned to the students.

"I shall try to give you an objective description of this construction my young friends. You know that an engine of such power has not yet been created anywhere. On the other hand this work contains no new or original ideas. We must be absolutely frank about it we have nothing to conceal because—" He shook the duster in his clenched fist and repeated a phrase which he had uttered years ago for the benefit of an American visitor at the Hotel National, "Wait till we get going!"

He looked anxiously at Nedolya to see whether the admiration shining in his eyes would give place to disappointment. But it didn't. The hall was hushed. The young people were hanging on Berezhkov's lips.

"What do we need for that?" he proceeded. "I repeat your commandment again, Professor Shelest, 'To stand on the ground of world experience with both feet.' That, comrades, is the tradition of this Institute. But—" Berezhkov looked round at the white smooth walls hung with drawings and smiled. "But with your permission, Professor, I would have a motto hewed out on this wall."

"What motto?"

"Faster! Faster! Faster!"

"You're letting yourself be carried away, my dear boy," Shelest said gently.

"Faster and better!" someone shouted out.

"That's right!" Berezhkov said quickly. "And I assert that there is nothing better in world engineering today than these ideas which I have taken and developed in my lay-out. I am ready to prove it on all points."

And the discussion went on.

It was beginning to grow dark when Shelest, who had been following the dispute with lively interest, exclaimed at last, "That'll do, that'll do!"

He took the drawings down from the wall himself.

"Let me have them, Professor," Berezhkov said.

Shelest smiled

"Oh, no, Berezhkov Findings keepings We are going to defend this on the commission together And we'll call it so "

Shelest lifted one of the plywood sheets, laid it conveniently on a drawing desk, and made a pencil correction in the heading It now read "ADVI-800 Lay-out by Designer A. Berezhkov"

The commission, at its very first meeting, decided to adopt Berezhkov's lay-out

16

But the commission did not live long

I was in the throes of creation again, Berezhkov continued My lay-out had been accepted, and the thing now was to work it out in detail The commission met almost every day I'd come in the morning with some sketches—a block or a diagram, others came along with ideas and suggestions of their own We'd start arguing The calculators had their own views I'd stand there drawing, Nieland would raise objections Opinion of the commission was divided Everyone was at loggerheads With all pulling different ways there was no real team work

Shelest tried to patch up our quarrels without offending anybody One day I had it out with him and did not mince matters either The situation was intolerable If he didn't do something about it, we'd be mucking about for another year without getting anywhere

By this time nearly everyone at the Institute had realized that you couldn't do any projecting without a head designer, that you couldn't have meetings of the commission over every trifling thing This was when a great event took place in my life Shelest announced that the design and calculating office was to be split up into two departments Nieland was to have charge of the calculating department, while I was appointed to the post of Head Designer of the ADVI

This was the beginning of another period of serious growth for me.

We now come to a very interesting contradiction in the creative life of a designer. On the one hand, as you will have gleaned from my story, we have the purely personal, sheerly individual and, if you like, intimate process of creative effort with its poetic inspiration, on the other, the prose of the drawing room, with its dozens of desks, its discipline, efficient routine, and the technique of modern designing. You have to distribute the tasks, see that everyone is pulling his weight, give direction to the work and ensure harmonious unity.

I came to understand many things I had not fully appreciated before. I realized of what tremendous importance for the development of technique was the psychology of the people who were creating these techniques. Now, when something happens to an engine of mine, when there is unexpected trouble with it, I do not content myself with a technical analysis but try to probe the depths of human psychology and seek the cause there. A modern designer is not only a mechanic or a naturalist who must be constantly learning from Nature, but an organizer and leader as well. He will achieve nothing great in his own field unless he learns to understand the human being—creation's masterpiece—his mental structure, his mind. A modern designer is a politician, a philosopher, and a psychologist who must understand the thoughts, the impulses, inclinations and capabilities of the people who are working under him, because it is only with their cooperation and ultimately with their hands that all projects and mechanisms are created.

I remember those days. It was more than growth to me, it was soaring flight. A new, hitherto unknown world was opened up to me. I had to think of every person, get to know him anew as it were, give him an interesting, absorbing task, lead him. I realized then, perhaps for the first time, what a joy it is for a designer to work in the Soviet Union and enjoy the support of the wonderful, enthusiastic youth, the new generation of engineers fos-



tered by the Revolution, who were imbued with the ideas and romantic spirit of the times. I hadn't fully appreciated before what an important role thought patterns and social ideas played in men's psychology and in our designing business.

You can imagine how enthusiastic I was over my work when I tell you that at odd moments I also managed to design the tractor engine which Ganshin had offered me to do. In my former depressed state of mind I had not been able to squeeze a single useful idea out of myself in that direction, hard though I tried, and now the thing burst upon my mind all complete with the effect of a revelation. I don't even remember when I did the drawing. I only know that I did it and handed it in.

At the Institute we sat day and night—the whole young staff—making thousands of detail drawings, or, as we called it, “pitching into” the ADVI-800 project. *Faster, faster*—was our motto. It became known that A. F. Headquarters was calling a conference to discuss the question of a high powered engine, and we decided to come to that conference with a finished, polished project worked out in minute detail and astonish them all!

In the drawing room, where I had now become the bandmaster, we worked at nights and sang. I remembered having got a tremendous kick out of those singing designers at the Zadneprovye Works when I first heard them, and we had adopted the same custom. A favourite tune with us was the Song of the Rich Guest from *Sadko*.

Yes, those were wonderful times! The first *pyatiletki*! We were on the locomotive of Time! Full steam ahead!

Berezhkov then went on to speak about the aircraft-engine conference that was convened in the spring of 1929. He started off with one of his pet exclamations.

It was terrific! In the brief space of three or four months as many as forty projects of what we then called

a high powered engine were brought forth. It was an amazing thing—no sooner did the call for such an engine go out than we, Soviet designers, who had met with so many failures and did not yet have a single aircraft-engine plant in the country that came up to the modern level, responded eagerly to a man, as though it was what we had been waiting for all the time.

A powerful Soviet engine, a powerful aviation, a powerful country—those were the ideas that sustained us, that filled the very air we breathed. A flood of projects came seemingly out of nowhere. Apart from several drawing offices which had been directly commissioned to deal with the problem of a high powered engine, drafts were also submitted by various other offices and individual designers. Gribkov, an engineer from the Kolomna Works, submitted the design of a star-shaped engine without a crankshaft. Panteleimon Gusin—good old Goosy, the aerosleigh inventor and motor-cycle champion—came along with a design of his own. Lukin, an engineer of the ADVI and an extremely modest man, sprang a mine on everyone by laying down on the table one fine day the project of a high powered oil engine. Makeyev, veteran Russian aircraft-engine designer, who had worked on engines for the heavy "Ilya Muromets" flying machines at the Russo-Baltic Works as far back as 1916, turned up in the Ukraine. Designs were submitted by Mikulin, by Brilling, by Shvetsov.

The Engineering Commission of the A. F. Headquarters was unable to cope with this flood of projects in the ordinary course of work. Which of them were to be engineered? Which were to be rejected? How were they to be sorted out, the good sifted from the bad? No one saw his way clear in these questions, because engine building, strictly speaking, was in its infancy with us and we were living through days of creation. That was when it was decided to call the conference on the question of the high-powered engine.

And so you find us assembled in the hall of the Engineering Commission in Varvarka—about a hundred

men in all, including the designers of the different projects

I particularly remember Rodionov at that conference, and was struck again by that combination of a dry business-like manner with daring imagination. In a short opening speech he outlined the aims of the conference—which was to discuss the projects and choose the best—and wound up with, "We here are giving battle. Giving battle to the capitalist world for engine performance. The future of our country is now being decided in battles like this." I felt a surge of deep emotion when that lean man in the blue military tunic, erect and trim as ever, uttered the word "battle."

There were no more speeches of exhortation or greeting. The conference at once got down to brass tacks.

It was a regular massacre, I tell you!—Berezhkov exclaimed gaily. The drawings of the various engines were hung up in the hall and each designer made a report about his thing, and then the designers of the other projects fell upon it and tore it to pieces.

Our Institute was represented at the conference by the ADVI-800 project. The sectional drawings were done to full size down to the minutest detail. Some assemblies, moreover, were depicted on separate sheets with dimensions given to within a tenth of a millimetre. Alongside these we hung up the table of calculations. Everything was done with a thoroughness and finish calculated to sustain the reputation of our Institute as an advanced designing organization, and in comparison with most of the other projects we succeeded beyond all question in displaying a higher class of work.

Our draft was introduced by Professor Shelest, whose prestige stood high with everyone in the hall. The conception of our thing was perfectly clear. It was based fundamentally on the block-cast system of the five hundred horse-power Wright engine. Our modifications were these: we had provided for still greater rigidity by such and such means, and we had altered the dimensions which enabled us to sharply increase the power factor. Here

were our constructive solutions, here were our calculations

Backed by Rodionov, we ridiculed at the conference that harmful class of half-cock inventors who went by the name of "Whizpropists."

What? Never heard of it? Then I must tell you the story of its origin. A speaker at the conference set that expression going. His was a very witty speech. One of the gags he told the conference was this. One day an inventor came to see him at the military institution where he worked.

"I say, comrade, may I tell you a state secret?"

"Of course. That's what I'm here for."

The inventor leaned over and whispered mysteriously:

"No more gas attacks."

"That's interesting. Why not?"

"Because I've invented a whizprop device that repels them."

The inventor produced a drawing. Imagine a machine-gun with a travelling adapter set over the muzzle packed full of tiny propellers. When the enemy starts a gas attack, you start firing your machine-gun, which is so arranged that a propeller attaches itself to the tip of every bullet as it shoots out, and starts revolving in the air, thus raising a wind which drives the gas back on the enemy.

The inventor was asked:

"Why do you call it a whizprop?"

To which he answered:

"Very simple. The bullet *whizzes* out with a *prop* on it."

The conference roared with laughter.

I came down on whizpropism like a ton of bricks. And shall I tell you why? Because I was predisposed towards it myself. I always had the dream project on the brain, was for ever sighing after the ultra-fantastic. Luckily, my ways in engineering were not dark and crazy. I had the good fortune when still a child to come into contact with Zhukovsky. My meetings with Ladoshnikov were of great importance too. The influence of my friend Ganshin, and afterwards my rigorous training at Sbelest's Institute also played a vital part. It all tended to discipline me.

You see what a peculiar position I was placed in. Here was an inventor and a dreamer thundering against inventionism, a Russian designer, who hankered to challenge all the world's designers, demanding but one thing—that for the time being we should follow in their steps. To borrow all that was best in world engineering experience and to start building up only from that ground work—such was our position at the conference, such was the meaning of the ADVI 800 design.

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Whizpropism became quite a catchword at the conference, Berezhkov went on. But sometimes it was used in a way that put my back up.

I remember Novitsky taking the floor. Several years had passed since I had had that brush with him in Rodionov's presence when the ADVI-100 design was under discussion. He was no longer chief of the Engine Section of the Engineering Commission, but director of Motorstroil, one of the *pyatiletka's* biggest construction projects on the Volga. He still wore a semi-military suit—a cloth tunic and soft leather high-boots—but his tread was noticeably heavier. A man in charge of a real big job, he gave me the impression of feeling somehow more grown-up as compared to us designers, who had come here with their projects, their ideas, and dreams. He listened to our vehement disputes with a half-amused tolerant smile, which, when it left his lips, still lingered in his keen brown eyes. He had been called up from the building site to tell the conference what progress construction was making there and what the prospects were. Things were being done on a truly tremendous scale. Even during this first year of construction the plant was costing as much as half a million rubles a day. Could anyone have dreamt of such wonder-work in old Russia? We listened to him with bated breath.

"Well, what engine are we going to turn out there?" Novitsky said.

He looked at the walls, which were hung with drawings, and I caught again the shrewd amused smile that lurked in his narrowed eyes.

'Perhaps the safest thing,' he continued, "would be to start with the production of a tried and tested foreign model, which could afterwards be replaced by one of our own design evolved at the plant itself. And, of course, no whizpropism!"

I winced at that. I must say. To think that after Rodionov's "giving battle to the capitalist world for engine performance" we would hear this statement about starting with a foreign model from the director of Motorstroi, that self-assured man who stood so firmly on his feet! Did he consider our projects, every one of the projects we had submitted that day, just child's play, whizpropism? No, it couldn't be! There was something wrong about it all.

That tag, by the way, was something that engineer Lubarsky also seized upon. He had been removed from the Zadneprovye Works—"knee'd out," to use a phrase of Pyotr Nikitin's, if you remember—and transferred to the office staff of the Aviation Trust. He stepped on to the platform with the same old lordly air and well-groomed little beard and expressed, without a trace of irony, his gratitude for the coining of a new term, for which, he averred, philosophy and science were much the richer. I felt that everything Russian, everything Soviet, was just whizpropism to him.

He attacked the project submitted by the Zadneprovye Works with scathing sarcasm.

We cannot pass this project over in silence here.

This project was submitted jointly by Makeyev, veteran Russian designer of aircraft engines, and his assistant Pyotr Nikitin, who was, I believe, the youngest man at the conference. If I am not mistaken, I already mentioned that Makeyev had helped in the building of an engine for the

"Ilya Muromets" airplanes at the Russo Baltic Works during the world war. During the economic chaos that reigned after the Revolution he lived somewhere in the backwoods in a Ukrainian village, then one fine day, the story runs, he turned up at the Zadneprovye Works—a grey-bearded old rustic with a staff in his hands. Or it may have been Pyotr Nikitin who hunted him out for all I know. In any case, they submitted a joint project.

We defended the principle of maximum rigidity of the engine, whereas Makeyev and Nikitin, who had previously stood for rigidity, now argued in favour of maximum structural flexibility. Their engine was entirely unorthodox and was based on profound and interesting ideas. Makeyev and Nikitin argued that a high-powered engine should be made as flexible as possible, as that would enable the force of the explosion in the cylinders to be sharply increased. By the use of devilishly intricate mathematics they calculated the cylinders in such a way as to give them the freest possible play, like piano keys. This opened up new possibilities in engine performance.

Naturally, there was no end of objections. This cannot very well be explained without going into technicalities. But the inventors mathematically quashed all criticism. I could have returned the Zadneprovians their rebuke about the solution being too abstract. But here, too, they stood on firm ground. They produced also a plan for tooling up the Zadneprovye Works to manufacture the proposed engine. No other project at the conference was supported by this kind of production planning.

The Zadneprovians' design was adopted at the conference together with ours. The whole of our ADVI group voted for it.

Our engine was numbered D-24, the Zadneprovian D-25. Did I explain this system of numeration to you? Well, the letter D stands for *dolgatel* — engine — while the figure is the ordinal number. This number, as you see, had already reached 25, but no Soviet airplane had so far been powered with a home-produced engine.

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"I believe in your engine, Berezhkov," he cooed "I'm prepared to swear by it I consider it my sacred duty to give you all the help I can You have in me a devoted friend," he said, lavishing compliments and promises and smacking his lips with relish while I stood staring at him dumbfounded, stammering some incoherencies in reply

At last we took leave of each other, and I went off at once in search of Shelest

"Our engine is in serious danger, Professor," I told him

"My dear boy, what's the matter?"

"I've just met the world's biggest rogue The one who cheated me out of my flour mill "

"And did you thereby a good turn, by the way "

"It's no joke, Professor He's a rotter He's prepared to do anything for money I can see right through him He hates the Soviet Government, he hates you and me, he hates our aviation "

"Why all this vehemence, Berezhkov? Don't bother your head about him "

"It's all very well, but you and I are in his hands. He's in charge of the new engines at the Aviation Trust. We mustn't allow it, Professor "

"Who's the man?"

"His name is Podralsky "

"H'm. Isn't that the man who had that hush-hush laboratory?"

"Yes The most artful dodger living "

"Aren't you exaggerating, my dear boy? I've had occasion to come in contact with him lately I thought him a sensible man "

"Where did you meet him?"

"Here He organized a testing laboratory here, in the engine section "

"And you kept it from me?"

"Excuse me for not having reported it, sir "

"Professor, believe me, he's a rotten egg It makes my flesh creep to think that Podralsky will have power over our engine."

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"Professor, believe me, he's a rotten egg. It makes my flesh creep to think that Podralsky will have power over our engine."

"Don't let that worry you too much. For one thing, his role in the Aviation Trust will hardly be as important as you imagine."

"He'll kill our project! He'll find a way of ruining us! You enjoy tremendous prestige, Professor. A word from you will have him politely pushed out."

"That's not so easy as you think, my dear boy. This Podralsky of yours, if I am not mistaken, was taken on the staff of the Engineering Commission under Novitsky. I shouldn't think Novitsky would have been careless about such a thing. You know how strictly people are checked here."

"Then let's go and see Novitsky!"

"Let's."

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Novitsky was among the platform party. Shelest sent him a note asking him to come out in the corridor.

Novitsky walked up unhurriedly, his brown bulging eyes looking rather sleepy. Evidently the director of Motorstroi was taking it easy at the conference, saving up his nervous energy.

"Comrade Novitsky," Shelest began, "we wanted to have a word with you. It's rather a ticklish subject. Comrade Berezhkov here attaches too great importance to it. I'm afraid, but—"

"Never mind. We have learned to take Comrade Berezhkov's tirades with a correction factor. What is it all about? You've got me interested."

"The question concerns a certain person," Shelest answered. "I repeat, it may not be as serious as we think. In short, we are rather uneasy about the fact that Comrade Podralsky has been put in charge of the Experimental Engine Building Department at the Aviation Trust. Is he the right kind of person for that job? Since you've been working with him, Comrade Novitsky, we thought it only proper—"

"You did the right thing!"

Novitsky became wide awake in an instant. His swarthy face lost all trace of its former drowsiness. The mocking smile that always seemed to be lurking in his eyes had vanished too.

"You did right!" he repeated. "Plain speaking is always best in such matters. False delicacy may only do harm, Shelest."

"Hullo, you sound as if I'm to blame now."

"You said that it may not be serious, Professor. We can never be too serious in anything that concerns the aircraft industry's leading personnel. We shall have to thrash this matter out without delay. We'll turn up the records. This is our own diocese, thank God."

A minute later he ushered us into the private office (once his) of the chief of the Engine Department of the A.F. Engineering Commission. The room was unoccupied at that hour, its present occupant being engaged at the conference. Novitsky invited us to sit down, and without wasting a moment's time, got the Personnel Department on the house telephone.

"Is that you, Nikolai Stepanovich? Do me a favour, will you. It's necessary to look into Podralsky's *bona fides*. Will you please collect all the material I daresay you've got it ready, seeing that he's being transferred to the Trust. You have? Good. May I trouble you to step in here for a minute? Yes. We shan't be disturbed here."

The talk over, Novitsky pulled out one of the chairs ranged against the wall, placed it near the desk, and sat down on it with one leg crossed over the other. I thought I saw the old mocking twinkle come back into his shrewd brown eyes. But I may have been mistaken. When I looked again, it was gone.

"Was it you raised the alarm, Comrade Berezhkov?"

"Why, even Zhukovsky used to speak of Podralsky with distaste," I said agitatedly. "He called him a swindler."

"Zhukovsky?"

"Yes. I swear Podralsky never did an honest deed in all his life. He'll sell anything and anyone. I'm afraid

for my engine if Podralsky's going to have anything to do with it. What's he doing in aviation, anyway?"

Just then an employee of the Personnel Department came into the room. He was a young man in a dark blue military uniform then worn by officers of the Air Force. He bowed politely to all of us, and handed Novitsky a file.

"You will find here copies of his personal record, Comrade Novitsky," the man said in a quiet deferential voice. "There is some supplementary material there, too."

"Thank you," Novitsky said. "These comrades"—pointing to us—"are known to you, I trust?"

Yes, the Personnel Department man knew us both and confirmed the fact with another little bow. Novitsky nevertheless introduced us. Then he said:

"Will you please allow them to see these documents. I have special reasons for asking."

Upon receiving permission he turned to us.

"Comrade Shelest! Comrade Berezhkov! Move up closer. We'll go through this together."

Novitsky opened the file and turned over the title-leaf. When I saw the first document I got the shock of my life. Can you imagine—it was a photocopy of a testimonial signed by Professor Zhukovsky! I recognized his large sprawling hand at once. It was dated 1916. Zhukovsky described Podralsky's laboratory as being an interesting enterprise, meriting notice and support, and made special mention of the fact that in undertaking to build Ladoshnikov's airplane and the Adros engine it was doing a service to aviation.

Novitsky looked at me.

"But this..." I stammered, "Zhukovsky wrote this to help his pupils. And Podralsky used it to..."

Novitsky turned over the next paper without saying a word. It was another note by Zhukovsky, this time copied out on a typewriter. I saw at once that it was the note of introduction with which Ganshin had first called on Podralsky. Zhukovsky expressed the hope that the young mathematician would be of service "in the varied and valuable researches which your laboratory is doing." A

red pencil mark was made against these words in the margin.

Although I knew Podralsky well, I couldn't help being amazed at the man's smartness. How on earth had he wangled all these papers, and even Zhukovsky's little note, into his personal record? What a precious liar and muckraker I must have looked, blackening a man's name for no reason whatever!

Novitsky, meanwhile, was thumbing through the file. A number of documents testified that Podralsky was a distinguished designer and inventor, the inventor of the amphibian war machine, and manager of a large laboratory. One paper was signed by General Polivanov, War Minister in the tsarist government, another by General Alexeyev, Chief of Staff of the Supreme Commander-in-Chief.

"He stole that amphibian, too," I said gloomily.

Novitsky turned over the next document. It was a paper issued by the Moscow Bureau of Inventions in 1920 certifying that Podralsky was the author of a valuable proposal for the utilization of turpentine as a motor fuel, a proposal which, during the difficult period of the Civil War, when there was a critical shortage of petrol, had been of great service to motor transport. This sounded most convincing and authoritative. The certificate was signed by several members of the Moscow Bureau of Inventions. Among them, worse luck, was my own signature. I remembered having signed that paper without giving it a thought. And now here it was.

Novitsky did not examine it. He was leaning back in his chair, staring out into space. My name had not struck his eye, of course. So much the better. I'd say nothing about it either. But no sooner had I said that to myself than Novitsky murmured:

"I suppose it must have been some other Berezhkov who wrote this about Podralsky?"

Damn it all, when had he managed to decipher my signature there! Could he have studied all this before, when he sat in this office as chief of the department? What a memory he must have!

"No, it was me."

"You?" Novitsky said with unconcealed mockery.

That was all he said, but I felt that my warnings, all my servid assurances about Podralsky's dishonesty had fizzled out. Shelest had been sitting beside me, and when leaning over to examine some paper or other I had felt the pressure of his shoulder against mine. Now he moved away. No doubt he thought this just another piece of extravagant behaviour on my part.

Further documents illustrated the history of the "Progress" flour mill. The patent, the license and other papers testified that engineer Podralsky had invented and successfully operated a new type of mill with vertically rigged millstones. Mention was even made of the new method of grooving according to the principle of the Archimedean spiral. It was further testified that Podralsky's invention had rendered a service to the country by meeting a pressing need of the city's population at a most difficult time.

I read the papers in silence as they came up one after another. He certainly knew how to present himself to advantage. *old Pussycat!* I was curious to know what he had been doing with himself after the failure of the flour-mill. It turned out that he had found a snug job in the Ordnance Service of the Red Army. A certificate stated that Podralsky had been working for several years on an invention of a military character and had proved himself to be a good organizer and able chemist. So he was a chemist too! Had he offered the O.S. an explosive by any chance—that same explosive which that unlucky beggar Mamontov had invented and sold to him under the name of "moskovit," which was subsequently changed to "fizit"?

What could I say or put up against that overwhelming flood of documents!

"He's an out-and-out rogue! A champion swindler!" I said.

"Perhaps he was guilty of some offence that concerned you personally?" Novitsky said, narrowing his eyes.

"Let's hear it."



His glance, which but a moment before had been so keen and watchful, now seemed to have lost interest and even looked drowsy again. Suddenly I saw what he was driving at. I felt that he was all tensed for my reply, waiting to pounce on me and show that my protest was an attempt to settle old scores with Podralsky against whom I had a private grudge. I should have guessed that before. Obviously, Novitsky was defending not so much Podralsky as himself, his own prestige, his reputation as a chief who never made mistakes.

"Well, we're listening," he turned to me again.

But I said nothing.

"What is your opinion, Professor Shelest?" Novitsky said. "Have we grounds for demanding the removal of Podralsky? Have we any moral right to cast a slur on him?"

"Frankly speaking, Comrade Novitsky, I don't feel that I have," Shelest answered.

Novitsky put the same question to the Personnel Department man. The latter agreed with Shelest.

They all went out of the room and left me sitting there alone. Presently I got up and went over to the window. Where and whom was I to go to now? Novitsky had been able to stop my mouth up with papers.

The door slammed again. Turning round, I saw Lubarsky. We greeted one another. He drawled with a faint smile.

"Someone has upset our maestro, I see."

I had met Lubarsky once or twice since the row we had had in his house in Zadneprovye. Relations between us were cool, but occasionally we exchanged a few words. The other day he had even congratulated me on my success, true, not without a tinge of irony in his tone.

"These gentlemen have upset you?" he continued. "I just ran into them. Novitsky was heading the procession."

I maintained a gloomy silence.

"Be a philosopher!" Lubarsky said. "We live in a vale of *grossièreté*, an all-pervading and appalling stereotype

where there is no room for high striving. Eat humble pie, that's your only consolation."

"I don't need consolation!" I muttered rudely, and left the room.

21

"I feel that our narrative is beginning to drag and needs whipping up a bit," Berezhkov said with a smile. "Let me skip eight or ten months and describe to you a day at the end of December, on the eve of another new year—that of nineteen hundred and thirty."

Berezhkov had been on tenterhooks all that morning, waiting for Shelest. They had arranged to meet at the ADVI at ten a.m., but Shelest was late. Berezhkov, in his greasy work cap and black oil-stained overalls, had run several times across the cold snowy yard from the workshops, where the disassembled D-24 was being thoroughly overhauled after one of its recurrent breakdowns, to the main building of the Institute to find out whether Shelest had arrived. He kept running out to the front entrance, glancing down the street, then, no longer able to contain himself, he 'phoned up Shelest at his house only to be told that the Professor had left an hour ago.

"But where is he? Isn't he ever coming?"

"I believe he wanted to drop in at the editorial office on his way."

"What editorial office?"

Berezhkov knew that Shelest was a member of several editorial boards: the Engineering Department of the Grand Soviet Encyclopaedia, a Scientific and Technical Publishing House, and the magazine *Motor*. As Shelest's household could give him no more explicit directions, Berezhkov started ringing up each of these editorial offices in turn. At one he was told:

"Yes, Professor Shelest was here only a moment ago, but he has gone now."

"Where to?"

"Just a minute. I beg your pardon, he's still here. He's downstairs in the barber's shop."

"The barber's shop?" Berezhkov shouted "Then tell him. Tell him everything will be ruined if he doesn't come to the Institute this very minute."

"What was that? What will be ruined?"

"Everything!"

He hung the receiver up with a bang, stared gloomily at the telephone, then stalked off to the workshop

After a while Shelest arrived

"What's the matter here? I thought the ADVI was on fire."

The director and head designer of the Institute were talking in the small workshop office. Shelest laid his big yellow brief-case on the desk, took off his grey felt hat, which he wore in winter as well as in summer, and began vigorously rubbing his ears. Berezhkov sniffed the air

"I believe you've gone and scented yourself," he said maliciously

Shelest burst out laughing. He was obviously in an excellent humour

"It was a good thing I guessed who rang me," he said. "Otherwise I'd have gone without a haircut on New Year's Eve."

He passed a hand over his gleaming black-and silver hair, which was now smoothly brushed back, and slightly ruffled it. Berezhkov shot a fierce glance at him.

"New Year be damned! If we don't get the bearing, we're done for"

"I thought as much. If Berezhkov doesn't get his bearing, the whole blessed world will go to smash. Here, sit down. Tell me all about it. Let's put our heads together"

"I've thought it out already. But we shall need your name to back it."

Berezhkov told him that the engine was being overhauled and various parts had been refitted and replaced. A new camshaft had been put in in place of the broken one, but the ball-bearing of this camshaft was found to be cracked. No spare bearing of that size was available at the Institute.

"And right next door," said Berezhkov, poking a black greasy finger over his shoulder, "there are any amount

of these bearings in the stores of the Aviation Trust. But they won't let us have any imported article! A hundred in one format! Have to be gone through!"

"Then what do you suggest?"

"Phoning up Rodionov at once, of course. You being the director."

"You're a sour nerve. Fancy ringing up the Air Force Chief over such a pudding thing as a ball bearing!"

"Well, so can you do? Keep the engine standing idle for six days, damn it!"

"No, I can't refuse. You've got to draw the line somewhere, my dear boy."

"Then I'll ring 'um up myself."

"Try it. Shule! And ironically."

"I will."

Berezhtkov reached for the telephone.

"Man alive, you can't do that! It's— it's simply indecent. Let's see if we can find some other way. One has to have very bad manners, too."

"You'll be talking about the honour of the profession next," Berezhtkov broke in. "No, Professor, this won't do. You know perfectly well that the Aviation Trust is just driving us from pillar to post. It's time we put a stop to it!"

Ignoring Shulest's warnings, Berezhtkov lifted the receiver and gave his number.

"Will you please put me through to Comrade Rodionov."

"Who is it speaking?"

"Please tell him it's Berezhtkov, the head designer of ADVI."

"What is it about?"

"Our engine. Unless Comrade Rodionov—"

"Your engine? Hold on, please, I'll report to him right away."

Berezhtkov waited gloomily, scowling at Shulest from under the shiny peak of his cap, which was jammed down on his head.

"Good morning, Comrade Berezhtkov," came Rodionov's voice. "What is it?"

"I'm sorry to bother you, Comrade Rodionov, but we need your help. We are faced with a loss of several days over one miserable ball-bearing."

"You needn't apologize, you did quite right to ring me up. Well, well, what's your trouble?"

"We can't get a bearing out of the Aviation Trust. And it's not just this once, Comrade Rodionov. They're plaguing the life out of us there."

Berezhkov did not mince his words. Gesticulating, encouraged by an occasional "well, well," he described the situation to an obviously attentive listener.

"I see," said Rodionov. "Will you please repeat the size of the ball-bearing. I'll make a note of it. Good. Send a car down to the store right away, and you'll get it. I'm glad you raised this question, Comrade Berezhkov."

In an instant Berezhkov was transfigured. He pushed his cap back with a dashing air, shot a look of triumph at Shelest, and exclaimed:

"Thank you, Comrade Rodionov! We'll start her up this evening, then. Tonight the D-24 will greet you from here with the New Year."

"But what if she stops, and right at midnight at that?"

"Never! You listen for her, open your window at midnight. I'll jazz her up so that you'll hear us without leaving your house."

"Will she stand it?"

"She must! I've made a New Year wish, Comrade Rodionov. If the D-24 works on New Year's Eve, then our airplanes will be flying on her in nineteen thirty."

"I wish you the same, Comrade Berezhkov. So you are going to spend this night with the engine?"

"Yes. If we get the bearing, that is."

Rodionov paused, then said simply:

"Well, well. Send the car round."

"We can run down, it's almost next door," Berezhkov exclaimed, laughing. "Thank you, Comrade Rodionov. Good-bye."

The conversation over, Berezhkov drew himself up to his full height, thrust his hands into the pockets of his greasy overalls, and faced Shelest:

"Ah, well, I'm afraid I'm getting old-fashioned, dear boy," the latter murmured "I'll probably stay that way to my dying day."

22

Several titlers and young engineers—junior design of the Institute—were overhauling the engine in workshop.

All the parts had been examined. The metal told a mute but expressive story to the trained eye by the tinge of perceptible signs, by barely visible patches on smooth steel surfaces, by the pattern of the lubrication. Some assemblies had already been rigged up again after overhauling, while others lay half-assembled on perfect level steel plates.

Berezhkov quickly walked up to the plates, followed at a more leisurely pace, by Shelest.

"Nedolya!" Berezhkov called.

Squatting on his heels over one of the steel plates, Nedolya was fitting up or resetting something in one of the engine's assemblies. He had his cap on, peaked backward, his face was pressed to the lit-up mechanism, one hand embracing the metal joint, as it were, was turning a shining disk with gentle almost imperceptible movements of its massive fingers, while the other held it underneath. Next to him on the steel plate lay a blueprint of the assembly. Nedolya was some time answering—the only sign that he had heard was a twitch of shoulder-blade under a jacket that must have once been brown but was now shiny-black. At last he tore his eyes away from the engine, stood up, pushed back a straggling lock of hair with the back of his hand, and said with a pleasant smile, "All set."

"We'll be all set in a couple of hours," Berezhkov said. "We're getting the ball bearing. Will you run down the store for it, old chap?"

"Are we starting her up today?"

"Yes."

"I'll get a clean-up first—shan't be a moment "

Asking no more questions, Nedolya dipped his greasy hands into a bucket with kerosene and started cleaning them. Then he went out and reappeared several minutes later looking completely transformed in a new woolly cap, a well-ironed blue striped suit, and a camel-hair pullover revealing a white collar and tie—the full regalia of a young engineer, junior designer of the Institute.

"You look smart today, Fyodor," Berezhkov remarked. Nedolya smiled embarrassedly.

"I knew that we'd be seeing in the New Year in here," he said. After a pause, he went on, "I'd like to ask you a favour, Alexei Nikolayevich "

"Certainly. What is it?"

"Well, you see, the boys"—Nedolya still had the graduates' habit of calling his young ADVI colleagues boys—"the boys would like to join us here tonight "

"Dash it, I didn't think of that!" cried Berezhkov. "A stunning idea! We'll make a night of it! We'll have hell-fire illuminations! We'll " Off he went, astride his imagination, but he caught himself up.

"Go and get the bearing! We'll see to this afterwards."

"Aren't you going to invite me?" Shelest said. He sounded rather wistful. Nedolya turned round at the voice.

"Do you really mean it, Professor?"

"If I'm not in the way, I'd—"

"Why, Professor, we didn't dare to invite you."

23

The D-24 was roaring out in the open under a half-shed. Tongues of flame from sixteen manifolds stabbed the night air. Indoors, not only the men, but the engine itself would have choked from the spent gases. Oxygen was what it needed, lots of oxygen. A strong spotlight was turned upon a long instrument panel where wavering dial hands registered r.p.m., power output, oil pressure, etc. A duplicate panel had been rigged up indoors,

in the Institute's testing station, to enable the work of the engine to be watched from there too

The mechanic in charge walked up and down under the shed, taking the readings. The concrete foundation quivered under the roaring engine. At the government test for which the Institute was preparing it, the engine would have to run like this for fifty hours without a minute's break or interruption. No aircraft engine, as every reader knows, can really be said to exist until it has been kept running steadily for so many hours in performance tests and has passed these tests (which, by the way, are now much stiffer)

The little side door in the garage-like gates of the testing station opened. A flood of electric light poured upon the sloping floor and the snow. More New Year revellers, enthusiasts of the Institute, came trooping into the hall, which was something like a workshop. At the farther end, amid all kinds of testing devices and machines, stood a table laden with food and drink, bought on a joint-purse arrangement. Two searchlight beams, one red, the other green, crossed over it. The "hell-fire illuminations" playing through the garlands of fir branches provided a fantastic touch. In the absence of a fire-place, those who wanted warmth could get it at the raised window of a flaming gas furnace. From crane beam to floor stretched a white streamer in the shape of an opened roll of drawing paper on which were inscribed the following lines of Mayakovsky:

*To be a Communist—  
is to dare,  
to think,  
to want,  
to venture*

One of the Institute's veterans, an old bookkeeper and a passionate lover of the accordion, sat on a face-plate as if it were a concert platform and played away on his instrument for all he was worth. One man started to dance, but got out of time and stopped the moment the door



opened. The accordion player went on playing, stretching the bellows of his instrument to their full length, but not a sound was heard. The D-24 drowned everything out.

In the little office partitioned off from the hall behind a light glassed wall sat Berezhkov, the centre of a young circle. He had shaved and washed and looked quite young himself. Someone had just rung him up, but before he could open his mouth the roar of the engine burst through the door. He turned to the glassed wall, waving his arms and shouting, but he could not make himself heard. Then the dance tune sounded once more. The wicket had been closed.

24

After a while Berezhkov went out again to look at the engine. As a matter of fact he could have stayed indoors where the instruments showed all the cylinders to be working steadily at a uniformly distributed load, but he was drawn irresistibly outside. He wanted once more to see the jets of flame shooting out of the sixteen manifolds, to study each one closer, and judge by the nature of the exhaust how the cylinder was behaving.

- He sat down on a stool and could feel the frozen ground quivering under its wooden legs. There wasn't an aircraft engine in all the world as powerful as this one. The roar of it was like music. Berezhkov shut his eyes the better to be able to listen for any engine splutter, but there was not a sound of harsh running. It was exactly a year now since that evening when. His thoughts flew back to that evening, to the lean sunburnt face with the mole on the tip of the nose and the pale patch of forehead under the cap, the face of that man who always carried himself so erect—Rodionov, the chief of the country's Air Force. Leaning slightly towards the lamp, he had opened a well-thumbed volume of Lenin and read out from it "Perish or drive full steam ahead, that is the alternative with which history has confronted us." And

then those memorable minutes in Rodionov's office a year ago, when Berezhkov had suddenly been seized with a tremor, shaking as he was shaking now on this stool. And then. Berezhkov smiled at the recollection of how he had dashed away from Ganshin's New Year's Eve party like a madman and run home through the deserted streets of nocturnal Moscow with but one thought in his mind—to get to his drawing board!

He touched the crankcase again, and could feel the engine's hot palpitant vitality. A year ago this was a thought, a dream, a fantasy, and now here it was, this fantasy, roaring its song to the shuddering earth. He took out his watch, looked at it, then mechanically put it to his ear, but he couldn't hear it tick, he looked at it again and saw the second hand going round regularly. He grinned. He hadn't got used yet to that tremendous volume of sound. It was like the roar of a cataract. Moscow had never heard anything like it before. Let her hear it now, on the eve of the New Year. In the coming year—it would be here in fifteen minutes now—the D-24 engines would lift the biggest and fastest airplanes in the world.

With the starry sky showing from under the edge of the shed, the stool quivering, the jets of flame drifting back on the wind, it seemed to Berezhkov that he was hurtling through space, rushed along by a locomotive, or a ship of Time. In the feeble light of the lamps the courtyard of the Institute seemed far away. Berezhkov seemed to be looking down on it from the deck of his rushing space-ship through some optical instrument or other: he could see everything, but not a sound reached him.

He saw the caretaker come out of his cubby-hole and noiselessly slam the door. The man went to the gate leading to the street and opened it. Headlights fell across the snow and a car drove noiselessly into the yard. Who could that be? The car had hardly come to a standstill when a figure in a darkish military greatcoat, military fur-cap and high-boots jumped out lightly on to the snow. There was something oddly familiar about the erect

figure. It couldn't be Rodionov, surely? Yes, it was. The Chief of the Soviet Union's Air Force. He was already striding towards the shed, towards the flaming exhausts and the roaring engine.

25

They saw the New Year in around the engine.

Rodionov stood by the brilliantly lighted instrument panel, where one could watch the D 24's performance, but he was not looking at the instruments. Just now, he was looking, with a friendly smile, at the young designers, who had flocked out of the warm hall with glasses and bottles.

Shelest shouted into Berezhkov's ear, "Ease up!" and showed his watch. The two hands had almost met at the figure 12. Not sure of being heard, Shelest confirmed his order by means of gestures. Someone uncorked the bottles of wine.

Nedolya shyly handed the first glass to Rodionov. The latter pulled off his glove and took the glass. The A. F. commander's lips stirred into what Shelest guessed to be his habitual "well, well," now uttered, seemingly, in an encouraging, kindly way.

"Cut down the revs!" Shelest shouted again to Berezhkov. "And give us the toast."

He indicated by dumb show that the head designer had the floor.

Holding his glass of wine in his left hand, Berezhkov gripped the gas control lever. The hand on one of the gauges showed that at this steady running the engine was developing about 700 h. p. Berezhkov looked at the gauge, looked around at the faces of all those who were standing out there in the frost and wind, waiting for the New Year toast, tossed his head up, and with happy shining eyes pushed the lever up instead of down and hopped up the engine. The dial hand moved obediently to 750, to 800, to 820. Oho, how easily she built up! The window-panes must have been rattling in all the houses of the

neighbourhood. People sitting at the festal boards were no doubt looking at one another, wondering who it could be, greeting Moscow at such a moment, when all the clocks were striking twelve. Who? 810, 850. It was a Soviet aircraft engine! Listen to it, Moscow! Perhaps Leningrad could hear it too? 860, 870. Berezhkov was afraid to boost the engine further. As it was she had shown a performance far above her designed capacity. He pointed to the gauges, pointed to the engine, then raised his glass towards the starry sky in a silent toast.

Rodionov went up to him and clinked glasses. Berezhkov had never seen such shining eyes before on the face of that stern and seemingly unemotional man. They were more than that. Rodionov searched the designer's face with a look of affection and heightened interest, as if he had suddenly discovered something extraordinary and amazing.

Jostling one another, clinking glasses, shouting and hearing nothing, but still understanding one another, they drank soundless toasts to "the land we live in," to aviation, to the engine.

Someone shouted with dumb show, "Tosa 'eml!"

Shelest and Berezhkov were rushed. Young arms lifted the fifty year-old professor, the founder of the ADVI, teacher of many a young generation, themselves included, and carried him, smiling, feebly protesting and clutching his grey soft hat, out into the open. Berezhkov jerked his head towards the instrument panel and waved his assailants back. He pulled down the yielding lever and smoothly clocked over the D-24, steadily reducing the shattering roar to a low rumble. One could hear one's voice now. Yes, an excellent engine. It had stood the forcing test splendidly. This pick-up ability, this almost instantaneous response in building up revs would stand the pilot in good stead in any difficult evolution.

Berezhkov did not escape being tossed after all. The emboldened young men next tackled Rodionov. The A.F. Chief in his dark-blue greatcoat was tossed up in the air, caught gently by dozens of hands and tossed up again.

The D-24, meanwhile, went on purring. Rodionov went up to it again, stood there for a while, then leaned over to Shelest and shouted something. Berezhkov brought his car closer too.

"When will she break down?" Rodionov shouted cheerfully.

"She'll break down all right, don't you worry!" Berezhkov yelled back just as cheerfully.

He was no longer a fledgling in this business, and knowing what to expect, he had armed himself with patience, "got his teeth into it," as he called it, in order to see the engine through all its life-acquiring stages.

"Keep us company till the morning!" he shouted to Rodionov. "She may fall by that time."

Rodionov shook his head. He couldn't stay so long.

He lingered by the engine, then went into the hall of the testing station, said good bye to everyone and drove away.

In fact, the engine did not fall until the morning, having made a continuous run of fourteen and a half hours. This was recorded for history by a brief entry in the engine log-sheet dated January 1st, 1930.

## 28

A few days later Shelest brought glad news. The higher state authorities had decided that the aircraft-engine building plant that was being erected on the Volga was to be designated for quantity production of the D-24. Shelest was shortly to leave for abroad with a special commission authorized to place orders and buy the necessary machinery for the new plant. The Aviation Trust was given strict orders to have whatever the ADVI needed during the development stages fabricated at its enterprises without delay.

In the absence of Shelest, Berezhkov, as Head Designer of the ADVI, was asked to take over his duties as director. Berezhkov flatly refused, and wouldn't yield even when Rodionov phoned him.

"I can't, Comrade Rodionov, I really can't. I'm sure to commit some monstrous official crime."

"Why should you?"

"Because I'm in a somnambulistic state just now"

"What state?"

"Somnambulistic. I'm not answerable for my actions. I see nothing, hear nothing, understand nothing but—"

"But your engine?"

"Yes. I'm like a bullet aimed at a single target—and that's to get the engine through the development stages."

"Quite right. It's what the whole Institute should aim at. And whose business is that, practically speaking? I thought it was the business of the engine's designer."

"Of course it is!" Berezhtkov burst out.

Rodionov laughed.

"Well, well. So that's arranged, Mr. Bullet. I'm glad to hear you agree with me."

"Wait a minute, Comrade Rodionov! I don't care how you decide this so long as I know nothing but the engine, so long as I'm not prevented from giving it all my attention."

"But who's going to be responsible?"

"I don't know about the legal side of it, but I do know that my whole life's work is at stake here. I'm responsible for this thing all the same."

Rodionov paused, then said

"All right. We'll think of something. Keep on at the engine."

The purchasing commission, supplied with all the blueprints, soon left, after having gone through dozens of engineering catalogues and drawn up the necessary specifications. Berezhtkov had taken an active part in this work and made no end of suggestions, which he illustrated by rough drawings in the margins of the catalogues or on odd scraps of paper. After seeing Shelest off, he continued developing the engine together with the ADVI staff.

One day Rodionov rang him up again. He asked how the work was going on, then said.

"I have a proposal to make to you, Comrade Berezhkov. What about flying out with me tomorrow to the building site? It's time you took a stroll through the shops where your engine is going to be built, and saw how things are going there."

"I have a counter-proposal, Comrade Rodionov," Berezhkov answered quickly "What about running down there in an aerosleigh? It'll be a glorious ride."

"With two or three adventures on the way?"

"Oh, no! Never!"

"Sure of that?"

"As sure as anyone can be, barring something incredible in the way of the unforeseen."

Rodionov smiled into the receiver. During those days when the high-powered Soviet aircraft engine seemed almost a reality at last, he often relaxed from his customary gravity and rallied Berezhkov.

"Why shouldn't we have an adventure, though? Who's to prevent us getting a thrill, eh?"

"Who, indeed!" Berezhkov cried "I bet we will. I've never made a single trip yet without something happening."

"I don't mind the unforeseen so long as it doesn't get us stranded in a snow-drift."

"Never! Snow-drifts in March? We'll have the loveliest of frozen snow-crusts. There's nothing in the world like it!"

"Is the sleigh ready for the trip?"

"In the ADVI it's always ready, Comrade Rodionov."

"Very well, then. I'll be at Lefortovo Platz tomorrow morning at six."

Berezhkov hunted Nedolya out in the workshops. They were giving the engine another thorough overhauling there.

"Fyodor, get busy!"

The junior designing engineer looked up puzzled.

"We're going for a ride tomorrow, Fyodor!"

"Where to?"

"We're going down to the Volga by aerosleigh."

"What for?"

"To look over the plant that's going to build our engine. See how things are going there."

Berezhkov repeated with relish the words he had just heard from Rodionov. He told Nedolya to get the sleigh ready for the journey. The younger ADVI generation were quickly getting their hands on everything at the Institute. Nedolya, like Berezhkov in his time, worked enthusiastically both in the design office and the workshops, and was as keen as ever on the aerosleigh, for which he and two of his colleagues were designing their first motor.

27

The journey went off without adventure or misadventure.

At ten a.m. they swept out on to the Volga. Berezhkov swung the sleigh round sharply. It heeled over, one of its runners tracing a perfect curve in the virgin snow. His face flushed and happy, Berezhkov looked round at Rodionov, who was sitting in the passenger compartment. The latter smiled and nodded, and Berezhkov sent the sleigh racing, with throttle full open, down the trackless frozen surface of the white river-bed between the high banks in which the clefts and gullies made deep shadows. The March sun was getting quite warm. The innumerable little crested drifts of hardened snow which were visible only at close quarters, had become brittle and porous.

Dazzled by the glitter of myriads of white snow crystals, stepping hard on the gas pedal, his hands resting on the wheel doing almost no steering, Berezhkov gave himself up to the sheer joy of that swift gliding movement which one can only experience when skiing downhill or coasting like this over the frozen ice-crust, when your sled seems to have lost all weight and skims across the surface, leaving only a light track of its runners. And, all of a sudden.

Berezhkov could never speak of any of his aerosleigh runs without introducing this dramatic "all of a sudden." I expected him to make a sustained tantalizing pause and



lift his finger, but instead he ran on excitedly with shining eyes

"And all of a sudden," he said, "I started Believe me, it was another of those stunning moments of my life! Can you guess what happened? The works! We saw the works!"

Around one of the bends of the river, the building site of Motorstroi suddenly burst into view. Parts of it were screened by the steep bluffs, the excavations, the road traffic, and work activity were hidden from the people in the sleigh. The huge building, with outlines softened by distance, seemed to have shot up right out of the snow. One saw rows of smokestacks, some of them only half up, the long latticed framework of uncovered roofs, the silhouette of a tower crane, the iron trestlework; the powerhouse with its characteristic short black smoke tubes resembling a ship's funnels. A red streamer fluttered in the wind from the highest building mast.

The plant drew nearer and its details stood out more clearly with every second. One could already make out the lightning rods on the smokestacks spearing the blue sky; the jib of a crane swinging a steel girder through the air over the roofs, the dark little figures of the "skylarks", riveters at work on roof beams, and here and there the flash of electric welding.

Berezhkov was entranced. Here was the plant that was going to build his engine! For months now he had been engaged in the gruelling task of developing the engine, his brain was concentrated on a thousand little details—here the slightest of shaft bends to ensure longer wear, there the tiniest of clearances measuring some hundredth fractions of a millimetre, which had to be found, detected by endless tests. Day in day out the same wearisome routine—examining the temperature charts and other readings of all the self-recording instruments, dismantling the engine, replacing various parts, readjusting. Next day some trouble again—oil-feed failure, overheating, valves, bearings, and so on. And only on rare occasions, towards the evening, did he have a minute's respite for daydreaming.

And now, not in dreams, but in reality, he saw here, on the steep banks of the great Russian river, stretching in the snow for several miles, the factory that was to produce those engines, the most powerful aircraft engines the world had ever known.

Nedolya in a black jacket and a fur-cap with lowered earflaps tied under his chin sat beside Berezhkov. He, too, with face pressed close to the windscreen, was gazing at the works. He felt hot. Pulling the strings, he took off his cap and brushed the perspiration from his brow with the back of his hand. A current of air blowing through some chink fanned his fair hair.

Berezhkov chose a convenient spot and ran the sleigh up the slope of the bank. The white ridge gradually screened the building site. Rodionov stood up and leaned over the back of the driver's seat to keep the works in view. Only the tips of the smokestacks were now visible above the ridge. The red flag fluttering in the wind came closer. Rodionov suddenly shook Berezhkov's shoulders, pointed ahead, laughing, and shouted above the roar of the engine, "Aha!"

They flew up the hill.

28

Berezhkov drew up at the power house.

A ditch for the electric conduit was being dug from here across the site to the main buildings. The line of work ran through a bare field. The frozen ground was being thawed by bonfires, hacked at with picks, axes, and crow-bars, and where these were inadequate, iron wedges were sledge-hammered into it and the earth chopped away lump by lump. Firers laid blasting-charges in the sunk pits, the signal horn was sounded, men ran for safety; a dull thud, then huge chunks of earth flying skywards, after the dust settled, the navvies went back with their picks and shovels.

In those days no excavators or lorries were being produced in the country; all across the wide-open space only

a few old lorries trundled over the pot-holes, peasant horses could be seen everywhere, trotting backwards and forwards, bearded men in peasant coats and bast shoes shovelled the clods of earth into carts and sledges

Carpenters and fitters moved down the freshly dug ditch in the wake of the navvies. The warmed-up steaming concrete was poured out of tubs on to the falsework of the ditch and the reinforcement metal right out there in the frost and rammed down. Men shouted to one another in a variety of vernaculars, which betrayed the Volga dweller, the Muscovite, or the Ukrainian. One could see the tall Papakhas, which the soldiers had worn during the last war, Kubankas, Russian flap caps, frayed Budyonovka helmets and quilted Tatar caps. Berezhkov's attention was arrested by an odd group in motley padded eastern robes and Asiatic fur-caps. These were dusky Uzbeks or Kazakhs. "That's Motorstrol for you," Berezhkov thought excitedly. "They've got the whole country on its feet for the sake of that engine."

Rodionov, clad in a black leather coat that showed no military insignia and a lambskin cap with a star badge on it, walked ahead. Nedolya, who was walking at Berezhkov's side, looked back at the power house, behind which he had parked the aerosleigh in a quiet nook.

"I won't go any further," he said. "I'll stay here a bit, then look over the sleigh."

"Plenty of time for that. Come along," Berezhkov said.

He was drawn irresistibly towards the long buildings of the shops which stood a little way off. Through the empty window openings and the gates steam engines and freight cars could be seen moving about inside. The heavy trolley of an overhead travelling crane, which was being hoisted to the top, hung swaying from steel ropes under the framework of the roof.

The path led them out on to a sled track. A long train of cart-sledges loaded with earth moved down it. Small clods of frozen loam and sand strewn the road. The runners mashed them into the snow. A motor car came into view in the distance. It worked its way slowly down the

road, which ran through the snowy field in a broad pale brown ribbon.

"I'm not going any further," Nedolya said again.

Nevertheless, he stepped closer up to the ditch, where work was in full swing. Berezhkov took him by the arm. For a moment they stood there without speaking. Rodionov stopped too.

"My God isn't it just wonderful!" Berezhkov said. "It's a miracle eh?"

"Yes," Nedolya said. "And look how they're working. Shows you how badly the people need our engine."

Berezhkov laughed happily.

"That's a bit thick, Fyodor. That fellow over there probably doesn't care a damn about engines."

He pointed to the driver of a passing sledge, an unshaven man in a Papakha, who, with mittens stuck away under his arms, was rolling himself a *makhorka* cigarette with thick earth-stained fingers.

"Philosophically speaking, though," Berezhkov resumed with a smile, "perhaps the whole meaning of his life is in helping to create the engine. That's just the wonderful thing about it, Fyodor—all these muzhiks, who had never had the first idea about engines, have been pulled off their warm stoves and lugged out here—"

Rodionov was standing within earshot. Suddenly his neck reddened and he spun round.

"Don't talk rot!"

Berezhkov saw his red angry face, the oddly lifted fair eyebrows. Nedolya dropped his eyes and walked away.

"Where are you off to?" Berezhkov stammered lamely.

Nedolya quickened his steps.

"Don't you understand," Rodionov said quickly in a voice that still had a sharp edge to it, "don't you understand that he feels ashamed on your account!"

"But, Comrade Rodionov, I—I only—"

"You only said that the meaning of life for all these people"—Rodionov pointed round with a quick circular gesture—"was to make your engine. As if all these muzhiks, as you choose to call them, are living just for the sake of an engine and its genius of an inventor by the name

of Berezhkov! It's shocking! Disgraceful! They rose up to put an end to age-old oppression, they've made the greatest revolution in history, they fought for it, shed their blood, starved, sickened with typhus, but held their own against overwhelming odds and drove out the armies of fourteen foreign states. And now they're working, building factories on their land. What for? To please Berezhkov, or, if you like, give him creative satisfaction? Not likely! They really don't care a damn about it, unless unless you serve the people yourself! And philosophically speaking, Comrade Berezhkov, let me tell you this: the meaning of your own life is that, whether you want it or not, you are serving the very muzhiks you speak about so scornfully."

"Comrade Rodionov, I . . . Of course, I . . ."

"Of course, you were talking a lot of rubbish! The people for the engine! What nonsense! You and I are both serving the people, living for it."

Berezhkov stood there, trying to force a smile into his face like a guilty schoolboy. Rodionov broke off his lecture. He said nothing for a while. His face gradually relaxed, and the angry colour drained from his sunburnt cheeks.

After relating this episode to me, Berezhkov said thoughtfully

"I don't suppose you can skip this in your novel, can you? You've got to know everything. Your hero was such a political ignoramus that even so many years after the Revolution he hadn't yet grasped such a plain and simple thing as the essentially human character of socialism, the fact that it primarily stood for the liberation of man from the yoke of exploitation. Until then it had been other aspects of our Great Revolution that had gripped my imagination—such things as patriotism, the amazing scope of industrialization, the daring conception of the five-year plan, and so on. This profound human character of socialism—the primary cause of all the wonders we were working—was to dawn on me last. It's a confession I make with regret. However, let us return to the building site, my friend."

The motor car was coming down the road towards us. Rodionov looked at it, and said in quite a changed tone, as if there had been no outburst.

"Well, well. I believe they're coming for us, Berezhkov."

Novitsky, the director of Motorsrol, jumped off the running board.

"Good morning, Comrade Rodionov!" he cried cheerfully. "What's this, a surprise visit? Decided to catch me unawares? Ah, Comrade Berezhkov, too! How d'you do. Welcome to our works!"

He shook Rodionov's hand, then struck his hand against Berezhkov's and wrung it hard.

"I've been expecting you for ages, Comrade Berezhkov. When are you moving out here? I've had his private office plastered already, Comrade Rodionov. But where's the engine? You'd better hurry up if you want to keep up with us."

Novitsky was some two or three years younger than Berezhkov, but he did not look it. Like Rodionov, he wore a black leather coat, but it failed to conceal his rather corpulent figure. Apparently he was very keen on his job, his brown eyes had the old sparkle in them, but they had puffy little pouches under them, and the bloodshot whites and inflamed eyelids bore witness to the fact that he had not been getting enough sleep for months.

"Well, well, how's your health?" Rodionov asked, studying Novitsky's face closely. "What about your heart?"

"We'll talk about my health when we've got the works going, Comrade Rodionov. I'll go for a holiday then. Couple of months in a sanatorium. That is, if you let me go."

"Why, certainly."

"I'm afraid they'll dig up some new urgent job for me right away. Get in," Novitsky said, opening the door of the car. "If you have no objection, I'll take you down to have a bite first."

"No, thanks."

"Then give the word. Where would you like to go first? Or would you care to leave it to me?"

"Let's just take a walk over the site."

"With pleasure."

They walked down the road, Novitsky at Rodionov's side, Berezhkov following behind. He looked round thoughtfully, every now and then listening to what Novitsky was saying in his powerful bass.

"I'm driving the tunnel for the conduit just now," Novitsky was saying. "The travelling cranes will get high-tension current on schedule—the first of May. And then I'll start at once installing the machinery."

"... We're housing the equipment all right, Comrade Rodionov. I check up on it every day. Would you like to drive down to the warehouses? It looks very much as if we'll be up against the old trouble—incomplete sets, however. I'll let you have a report about it tomorrow."

"... We've set up our own auxiliary enterprises. That problem's been settled, Comrade Rodionov. We now have our own timber mills, machine repair shops, concrete plant, brickworks, boiler works."

"... The roads are bad. Hard on the transport, you know. Yes, I'm having a narrow-gauge run down. But we're short of rail chairs and spikes. Could you get this pushed on in Moscow, Comrade Rodionov?"

"... The fence? That's going to be a heavy pull on our purse, Comrade Rodionov. It'll cost us a million if it costs a ruble. We'll tackle it in spring. No, reinforced concrete. It's the cheapest and most enduring material."

Berezhkov walked along, catching snatches of this conversation and gazing eagerly at the buildings of the works' shops as they drew nearer. A thrill went through him again. My God, what a plant! A million-ruble fence!

All of a sudden Rodionov stopped in front of a long barrack-like building knocked together out of rough boards with windows misted from inside.

"What's this?" he asked.

"Just a temporary affair, Comrade Rodionov We'll chuck it out soon"

"But what is it?"

"The workers' canteen"

"Is that so? Let's have a look at it."

30

The place was cold inside and smelt of cabbage soup. The vapour drifting under the ceiling came into swaying motion when the door was opened. Hardly any of the tables were occupied yet, as it wasn't the lunch hour. Several workers in their outer garments and caps sat eating out of tin bowls. Right near the doorway, almost blocking it, stood a table heaped with wooden spoons, at which sat a girl in *valenki*, overcoat and a woollen shawl, reading a tattered book. Without tearing herself away from the book, she fumbled for a spoon and thrust it at Rodionov. He frowned, took it, and said, "Funny rules in this place."

The girl looked up and was struck dumb.

"Funny rules here," Rodionov repeated. "May I ask what you are doing here with those spoons?"

The girl falteringly explained that every person, on leaving the canteen was obliged to return his spoon. She pointed to a large basket on the table into which the spoons had to be thrown.

"And you are here to see to it that none of the workers takes one of these bits of wood away with him?"

"Yes."

Rodionov's neck, Berezhkov noticed, went red again. Rodionov took a clean handkerchief out of his pocket and wiped the spoon with it. A greasy stain was left on the handkerchief. Obviously the spoon had not been washed in clean water. He looked at Novitsky, and his eyebrows flew up threateningly.

"Would you like to dine here, Comrade Novitsky?"

Some of the workers sitting nearby became interested in the conversation. Somebody came out hastily from behind



a wooden partition at the end of the room and stopped irresolutely

"In the first place, the canteen is not my business Comrade Rodionov," Novitsky said quietly "The co op handles it."

"Not your business? And you call yourself a member of the Party, a director, a Communist?"

"Comrade Rodionov," Novitsky interrupted in the same quiet but firm voice, "you could have told me all this in the office, not here."

Rodionov kept his temper. He threw the spoon back into the basket on the table and strode towards the door without saying another word. Novitsky followed him down the steps, and said

"I'm sorry, Comrade Rodionov, but I must confess I've never been in the canteen. I've been so busy."

"More's the pity. It's a shame to check those miserable spoons! And the dirt in that canteen! Have you a kindergarten at the building site?"

"Yes."

"I don't suppose you have ever been there either?"

"I haven't, Comrade Rodionov."

"Well, well . . . let's go and see it. And then we'll go down to the Party committee. You're not a frequent visitor there either, are you?"

Novitsky did not answer.

The motor car, which had been following slowly behind them during their walk, was waiting outside. Rodionov turned to Berezhkov

"Will you please go through the shops, Berezhkov, and take a good look round. I'll meet you"—he turned back his leather cuff and glanced at his watch—"I'll meet you in two hours at the works' office over there, if you don't mind."

He pointed to a very conspicuous four-storey building, which had already been plastered and had windows put in, standing in the middle of the site. Then he got into the car with Novitsky and drove off.

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Exactly in two hours the same ramshackle old car drew up at the square building of the works' office. The façade was flooded with sunshine. Heavy soggy snow was being thrown off the roof from which the icicles hung in clusters. A broad flight of grey flagstone steps led to the main entrance, where massive oaken doors, puttied but still unpainted already hung on their hinges. Panes, spattered with liquid chalk, gleamed in some of the windows. The side porch was still enclosed in scaffolding, and a couple of wobbly planks acted temporarily as a stairway up which the workers trundled wheelbarrows at a run or carried in handbarrows loaded with cement, lime and sand.

"Where's Berezhkov?" said Rodionov, looking round.

"I suppose he's now dead to the world," Novitsky said.

"An impulsive nature, his."

"That's not so bad. Well, well."

The familiar "well, well" sounded a note of invitation to go on. Novitsky shrugged his shoulders. But just then Berezhkov appeared. He came out of the building, and ran down the steps of the main entrance towards Rodionov, looking very agitated.

"Comrade Rodionov, I'm done for!"

His energetic aspect—the slightly flushed cheeks nipped by the wind, the cocked fur-cap, the short tightly belted fur coat smeared with lime on the shoulder seam, the high felt boots planted firmly in the dampish snow—was so obviously at variance with the exclamation that Rodionov smiled.

"What's the trouble?" he asked.

"They've absolutely ruined me! I've been over the works."

"Well, well."

"A splendid work! A marvellous work! But no facilities for the head designer, absolutely none."

"What facilities do you want?" Novitsky asked drily.

"The design office has been pushed away in some corner, for one thing."

"A corner that measures two hundred and fifty metres square."

"I need a place three or four times the size."

"Oh! Perhaps you want the whole building?"

"No, I want another. One that hasn't been built yet. Comrade Rodionov, it's a terrible omission on our part. Where are we going to study the engine? Where's our testing station? The head designer needs a building of his own. And it's got to be the finest, the most wonderful building at the works."

"There he goes, off again to dreamland," Novitsky said with an ironical smile.

"Why, not at all," Rodionov put in. "Let's hear him out."

"Comrade Rodionov, I insist most emphatically on a separate building. Otherwise we'll simply kill our engine! Don't forget it has to be developed and refined year by year. We've got to work on it all the time. But where am I going to do it? Where am I going to experiment?"

And Berezhkov proceeded passionately to describe the building he saw in imagination—a building with special laboratories, where one could artificially create a rarefied atmosphere to study the engine's performance at various altitudes, with wonderful X-ray outfits capable of photographing the innermost parts of a working engine, and so on and so forth. Smiling despite himself, Rodionov studied the face of the designer with a peculiar interest, as he had done that night on the eve of the New Year by the roaring engine.

"Well, well, Comrade Novitsky, what have you to say to that?"

"I'd build all this with the greatest pleasure, really," Novitsky answered gayly. "I'd have all Shelest's Institute over here. But I've been given a definite project. It's law to me. I can't just build anything that I fancy or that our famous dreamer Berezhkov fancies. Like every modern works we have our check laboratories—"

"That's not what I want!"

"At any rate, Comrade Rodionov, there's been no end of discussion on the project and no one ever asked for it."

"I ask for it!"

"All right," Rodionov said. "We'll give you a building of your own."

And it was clear, as always, that what he said went.

"We'll give the engine designer everything he asks for, Comrade Novitsky," Rodionov went on. "We can't be stingy in a thing like this. It's a matter of " he paused, then added, "world competition. The project will have to be supplemented accordingly."

"I'll draw the plans myself" Berezhkov cried.

32

All three returned to the power house. The sun was still warm but its glare had gone and it now shone like gold. The clefts of the gullies had darkened. It was time to be going. Berezhkov strode ahead of his companions and made for the aerosleigh. Rodionov looked back at the works once more, then peered out into the white expanse of the riverside meadow where a little village lay buried in the snow-drifts. He sniffed the air, which was saturated with the smell of thawing snow, swiftly bent down, kneaded the white yielding snow into a ball and ahled it at Berezhkov. The snowball hit him on the shoulder. Berezhkov looked round. The next well-aimed missile caught him under his ear. Bits of snow got under his collar.

"A-a-ah!" yelled Berezhkov. "That's a game two can play!"

The snowballs fell thick and fast around Rodionov. The first was a miss, and so was the second, the third hit his cap, the fourth—ah!—the fourth landed in his ear. Berezhkov came on, yelling his war-cry, raking the snow together with wet reddened hands, and bombarding Rodionov without a stop to make him show his back. But Rodionov adroitly ducked and dodged the balls, and gave tit for tat. Ouch! Berezhkov stopped and wriggled his neck. More cold trickles were running down it. Look out now, I don't care whether you're commander of the Air

Force or not. Take that! And that! The snowballs pelted Rodlonov's black leather coat.

Novitsky came out from behind the power house. At the sight of the raging battle, he plunged into the virgin snow and launched a flank attack on Berezhkov. The latter fell back.

"Hurrah, the enemy's on the run, Comrade Rodlonov!" Novitsky shouted, panting.

But Rodlonov, without warning, shot a snowball at him.

"Come on, Berezhkov! At him! Go for the director! Down with the formalists!"

Berezhkov burst out laughing. Novitsky, attacked on two sides, took to his heels, but floundered in the snow, sat down and raised his hands in surrender. Rodlonov went up to Berezhkov.

"Wasn't that grand!" he said. "Now let's be going, old chap."

33

And now, Berezhkov said, continuing his narrative, let me tell you the sad tale of the D-24's tragic end.

March went by, then April, then May. The summer flew past with another winter close upon its heels, another new year, the year 1931. The works was ready to be started. The furnaces, presses, and steam hammers were already being tried out there, turners in the splendid machine shop were adjusting all kinds of clever automatic machines specially ordered for manufacturing D-24 parts, the main conveyor belt and other assembly lines were run free every day, but. . . But there we were—we had a factory, but no engine!

While the tooling up was in progress Shelest and I often flew out to the works and insisted on our demands and instructions being carried out to the letter; the people there got into the habit of asking my advice as head designer; the building of the testing station I had asked for

was being run up too—but damnation!—the engine still wasn't ready.

It was a year since we had built it, that ADVT-800 or D-24. You know how beautifully it had run, how easily it had responded to boosting and shown a performance in excess of designed capacity, but try as we would, we just couldn't pull it up to the requirements of the official long-run test of fifty hours. I stopped going to the works and neglected all other business to devote myself entirely to the engine. We were plagued again by countless delays with our orders at the enterprises of the Aviation Trust. We had to beg, and demand, and kick up endless rows before we got some factory or other to turn a batch of shafts, valves or pistons for us. Would you believe it, I even went to the extent of cadging all kinds of trifles from Podrasky, who had dug himself in at the Aviation Trust. The developing of an engine is a delicate job that demands literally thousands of replacement parts. The engine was constantly standing idle while we were trying to get the needed parts. It was just maddening. We wasted precious days in enforced idleness. We were being robbed of time.

Nevertheless despite all these tortures and delays, we managed to develop the engine up to a point when we definitely knew where we stood with it.

Valve failure, for instance, was one thing we were constantly up against. Our D-24, as we said, was "spitting valves." The engine would be running splendidly for ten or twenty hours, then all of a sudden when it would be going at full gun, one of the cylinders would fail. The engine would start wheezing and whistling, and power would drop sharply. We knew already what that damned whistling meant. We'd stop the engine and have a look. In the place where the cylinder valves are arranged in a row there'd be a black hole. The engine was intact, and only a valve had been blown out. We'd look for that valve for hours and find it at last somewhere at the bottom of the yard or out in the street. Sometimes it flew a distance of about a quarter of a mile.

Everybody was waiting for us to come out at last and declare the engine ready for the official test. But it kept



on "spitting valves," and whistling like mad after running smoothly for twenty, twenty-three, twenty-eight hours.

We groped about experimentally for some new form of valve, kept on making new drawings of this part and sending orders for it to the Aviation Trust, who made us suffer the tortures of the damned

Weeks and months went by, and still we couldn't report the engine ready

### 34

We were granted several delays and given help, Berezhkov continued. Things reached a point when the A. F. Chief himself began to attend to our orders to have them expedited

But all postponements had expired. A new, truly stupendous, first-class, fully equipped aircraft engine plant stood on the Volga, stood there idle because of us. The government could wait no longer. A decision was made to abandon our engine and readapt the plant for the manufacture of a foreign model. The designs of an aircraft engine, then the most powerful in Europe, were purchased from the German firm LMG. The firm undertook also to hand over all the so-called operating cards, that is, the whole technology of production, and guaranteed engine output.

I understood there was no alternative. During those last few months I was often amazed, or rather touched by the patience that was shown us, by the fact that the starting of the Volga plant was put off again and again to give us time. I felt that our unfinished engine, like a traffic jam on the road, was holding up the advance of the whole country, and although I was prepared for the decision I just told you about, it nevertheless came as a shock to me, a terrible personal blow.

I had staked my life on this engine. Her failure meant that my life had failed too. And then you musn't forget that a designer, a man of creative work, has that peculiar sense which we have already characterized in our book

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by the words "maternal feeling." No matter how prepared a mother may be for the death of her child, she hopes against hope to the very last.

The day when I learned that the D 24 was to be thrown overboard is very hazy in my memory. I remember Professor Shelest coming into my office. I was listening to the report of the duty engineer and examining the charts with the night's readings of the recording instruments. Our engine was roaring steadily outside the window. On my desk lay various parts of her, some used, broken, or showing signs of rapid wear, others quite new, with a dull turning surface. I handed one piece to Shelest, knowing that it would interest him. He turned the thing over in his hand without looking at it, then put it down on the desk. His gesture spoke volumes. I dismissed the engineer.

"All over?" I asked.

Shelest began to speak, but all I heard, the only thing I grasped was that it was all over with our engine. We were late. I must have sat there like one stunned. I don't remember getting up and walking over to the window, but the next moment impinged itself on my mind.

I stood leaning against the window frame, staring at Shelest, who sat perched on the arm of the chair, talking to me. I forced myself to listen. Appropriations, extensions. What was he talking about? I caught the drift at last. The Institute was to be extended, new buildings were to go up, and in two or three years the ADVI. Ah, in two or three years! But today or tomorrow we'd carry our engine out into the shed and there, in her burial place, she would go cold for ever.

Good heavens, but there she was outside, roaring, alive! It was dreadful, it was like a voice from the other world. I touched the window pane with my fingers—it vibrated. My ear caught the rattle which we in the Institute had ceased to notice from force of habit. So it was all over then? And nothing could be done about it? No, there was no such thing as the impossible! The engine had to be saved! Here there's another gap in my memory. All I know is that I rushed off to see Rodionov. How I went,

whether I rode or walked, how I got to his outer office and who I spoke to there—all this is a blank.

Then another gleam of consciousness—Rodionov's room. A long room, which I once described to you. Lots of windows in it. Along the walls—models of Soviet airplanes. And all of a sudden something struck my eye, something I had not seen there before. It was the model of an engine on a stand, fixed to a tall steel pivot. I recognized her at once—it was Pyotr Nikitin's construction, our first Soviet hundred horse-power aircraft engine. Nikitin had developed her after all, got her to pass the official test and placed into serial production. Absorbed though I was in my own troubles, the sight of it gave me a sudden shock. Can you imagine it—dozens of aircraft of all types, from small planes to large flying boats, designed and constructed in this country, and among them all just a single little engine of a mere 100 h. p. And no model of our D-24 would ever stand here. The country, which was forging irresistibly ahead, would still have no high-powered engine of its own make. We were again obliged to buy a foreign-made model. Comrade Rodionov, we just can't do that! Wasn't it you, Comrade Rodionov, who spoke about a battle of engines? We can't allow ourselves to be beaten, I tell you we can't!

It was hysterics—that's the only word to describe it.

Rodionov heard me out calmly. The straight-ruled parting of his, with reddish hair brushed down smooth and flat on either side with meticulous care, struck me with surprise again. With his hair as well that stubborn man had had his own way. Strange as it may seem, but even the birthmark on the tip of his nose, that irregular little mole, had a sort of hopeful look about it. How shall I explain it? It was as if the gravity of his lean face could not quite conceal the youthful ardour of his nature—a rebellious trait which he could do nothing to remove or smooth down.

Rodionov listened without interruption but for an occasional insertion of his "well, well." His tone, it struck me, seemed to say, "Get down to brass tacks! What do you propose?" But I wasn't proposing anything. I had

simply come running to him in despair. I remember his clear reply. The battle for a Soviet high-powered engine, he said, was anything but lost. We were heading towards that goal. We were paying big money to the Germans, but we'd start the works and master the machinery. We were buying time from them just now, paying for it in gold. We would reconstruct your Institute, or rather build it anew and put new weapons into the hands of your designers. Then we'd launch another attack! Well, well!

Again that pet phrase of his sounded to me like a question. "What do you propose?"

"Comrade Rodionov, I beg you. Give me another week. Just one more week."

"What can you do in a week?"

"I don't know. Probably nothing. But I'll do it."

"Do what?"

"I'll solve this damnable problem. I'll think of something. I'll come back in a week's time and report to you. 'The engine's ready for official test.'"

"Berezhkov, do you really think it possible?"

"No. Call a thousand specialists together and they'll all tell you in one voice, 'No!' That's what I would say, too, if I were one of them. But I'll do it all the same!"

In an instant Rodionov's expression changed. He was looking at me again, I noticed, with heightened interest mingled with affection. He believed me. It may have been only for a minute, but he believed me. It even seemed to me that his face lit up with joy.

"If that were only possible, Berezhkov. Tell me what you need."

"Nothing. I want to think. I'll report to you in a week's time."

"Good."

He stood up and gave me his hand.

I hurried away. I was afraid he'd read the despair in my face again.

Rodionov smiled encouragingly.

But Berezhkov could do nothing to save the engine, cudgel his brains as he might.

Those were days of torture, he said. I sat for hours, my head pressed in my hands, as if trying to squeeze some brilliant idea out of my brainpan. Or else I'd go out to the cold engine, which, after a current failure, had been left just as she was on the block-testing stand under the shed. No one ever touched her now. Everyone in the Institute knew that this unfinished creation of ours had gone overboard. I was treated with solicitude and care, and not bothered with questions or business. I felt that people were still expecting a miracle from me.

As a matter of fact I myself still believed in some brain-wave that would enable us in some marvellous way to solve all the problems of development.

What could be simpler, one thought? The cylinder valve? Instead of racking your brains, just take the Wright valves, or the Hermes, copy them exactly, and there you are. No more trouble! But we tried that dozens of times and just as often failed. The metal tore and the valves were kicked out the devil knows where.

Strictly speaking, I knew the answer to that riddle even then.

What we lacked to create an engine was an industry, production experience. This applies not only to aircraft-engine manufacture, which is the peak of modern industry, but to any other mechanism.

Take, for instance, the motor-car works which we were building in those years. Imagine getting a sample, a completely finished model of a small-displacement car, say. You take it to pieces, you make the most accurate drawings of it with exact dimensions, and start production according to those drawings. But nothing will come of it, for the simple reason that you don't know the technology of manufacture of the thing, you don't know the processes through which it went. Take such an elementary detail as the body, an all metal body. You've made it exactly according to the designs, ground it perfect, but when you

fit it into place it may break. Why? Because you don't know the history of its development. You don't know how many operations that sheet of steel underwent, what kind of operations and in what sequence. And that makes all the difference.

Times have changed now. We have forged so far ahead that others are now copying our engines.

Take a case like this. There is a war, and one of our planes is shot down over enemy territory. Or even in peace time, there's an accident, say, over foreign territory, and our plane just disappears, is lost. Actually it has found its way into some foreign research laboratory. And so our engine is in foreign hands. Go on then, copy it, pirate it. In the first place, it'll be a long and difficult job, because an engine doesn't carry about with it the history of its making—that is, the technology of its manufacture, showing all the processes by which it came into being. Secondly, from the very moment you have made up your mind to copy it, you have begun to lag, you are behind the times, the thing you have in your hands is the yesterday of aviation, since the designer you are copying from is a long way ahead of you and is already working on his next thing, developing it in cooperation with the whole works' staff, a big industrial community.

And the stuff the thing is made from, the metal itself? Let's say you've made a chemical analysis, found out the composition of the metal, and produced one exactly like it. But it breaks in operation, doesn't stand the strain. Why? The reason is that you don't know how that metal was smelted, how it was tempered, how it was cooled. Allowance has to be made for minute technological details, which are unguessable and only to be learned through long experience.

A designer is a toiler. He works, experiments, studies the engine and production painstakingly. I told you that since I grew to manhood I've practically never called myself an inventor. As you go down the street, something bursts upon your mind, and before you know it, you've invented something. Of course, you have certain specific laws here, too, but inventing is nevertheless the easiest



thing in our profession. The main thing is what comes after it—the endless gruelling toil.

We worked on the D-24, as you know, for close on two years. We had it nearly developed and completed. But it was at this point of "nearly" that we got stuck. It would have taken us months, perhaps a year, to overcome that piddling accursed "nearly." You might ask why we couldn't lose another year on development. For one thing, because aircraft-engine designs have a tendency to grow old. Things that were modern and up-to-date at the time of the engine's birth become out of date in three years and there is no longer any sense in putting them into production. And so the main difficulty we were up against was the lack of technological experience, the lack of a production facilities, a modern aircraft-engine building industry. We battled with innumerable difficulties arising from the essential nature of the problem, we fought against time in the face of endless delays that wore us down.

In the end we were obliged to buy the engine from the Germans. This decision seemed to me at the time a crushing defeat, but, as you will see further, it was the only right decision under the circumstances. Together with the engine we got technology, production culture, a rapidly growing army of trained men who learned to build powerful aircraft engines. We bought Time, as Rodionov said. Even he, that level-headed man, had believed for a moment in my still being able to perform some miracle. But I performed no miracle. I could do nothing to save the engine.

The failure of my engine was a stunning blow to me. I felt so agonizingly helpless, and was shedding—so I thought—my last illusions. I've had enough! No more high-powered engines for me! I wouldn't remove that self-imposed ban for at least five years, not until we had an up-to-date engine building industry of our own. If I ever forgot myself and started drawing some new high-powered construction I'd tear my designs up. But I would never start drawing, I would never permit myself to do it. May my right hand wither away if I ever break that vow, may it wither the very moment I draw the first line!

I had promised to go and see Rodionov within a week. But I didn't. It was too painful. I did not even ring him up. He understood.

I acknowledged defeat. The D-21 was struck out of my life.

The next New Year's Eve party was held at Berezhkov's place. There was quite a little crowd. Here is a scene characteristic of that evening's mood.

After having danced himself off his feet, Berezhkov signalled to Ganshin, and they both slipped out into the kitchen with a bottle of wine and glasses. The kitchen table was cluttered up with bottles, crockery and dishes with the remains of food. There were no chairs and Berezhkov suggested sitting down on the floor behind the large kitchen range, well out of sight. He had thoroughly enjoyed himself all the evening and felt pleasantly mellow. Bespectacled little Ganshin dutifully lowered himself on to the floor and leaned against the warm tiles of the range. Berezhkov swiftly improvised a table out of an overturned galvanized iron trough—the very trough he had painted in this same kitchen on that memorable evening when he had sorrowfully opened the cherished tin of enamel paint. The bulging sides and bottom retained traces of a faded brown coating, which still resembled the colour of the skin on baked milk. Berezhkov slipped off his jacket, pulled up the trouser knees not to spoil the creases, and sat down on the floor with his legs under him.

"We're like a couple of old Chinese," Ganshin said.

"Wise old birds," Berezhkov said.

He filled the glasses.

"What's the toast going to be?" Ganshin asked.

"Let's drink to that tram rule—d'you remember?

*Forget your empty fancies, friend,  
Just pay your fare and there's an end."*

"Have you forgotten them?"

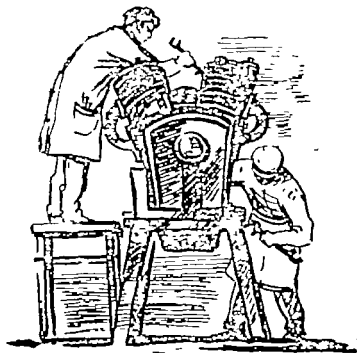
Berezhkov waved the question aside. He had already recovered from his spiritual crisis and was feeling none the worse for his experience, from which he had emerged shorn of his fantasies, resolved at last to be a realist, a man of hard common-sense. He had parted with his illusions again as he had with that tin of pale-brown enamel paint. And it hadn't turned out so bad either. He was thirty-six. He was Head Designer of the Institute Inventor of a sixty horse-power air-cooled tractor engine, which was now being manufactured in Leningrad. Say what you like, that wasn't bad at all. As good a point as any to start another life of Alexei Berezhkov from.

"The poet has no career, he has a destiny," he murmured. "But I'm not a poet any more, old chap. So here's to you, Ganshin, the greatest sceptic of all times and nations!"

Berezhkov raised his glass with a smile.

"We're seeing this year out gloriously, old bean. Good riddance to it!"

They could hear sounds of music. The pendulum clock ticked on the wall. Somewhere the Locomotive of Time was rushing along. The friends sat in the warm corner. Berezhkov philosophized. He had enjoyed the New Year's Eve party immensely.



"ALEXEI BEREZHKOV-31"

1

I was a long time "developing" this book, too. For the most part Berezhkov and I were quite pleased with one another. I liked the way he told his story, he liked the way I wrote it. But sometimes he made the most unexpected demands. On one occasion we very nearly quarrelled over the colour of his eyes.

I had described them as being "small greenish eyes." Berezhkov took the sheet and altered it to "blue eyes." I protested.

"They're greenish! I tell you, they're greenish and speckled."

"Like a cat's?"

"Well, yes, a bit," I answered incautiously.

"No! I won't have it!"

I laughed. But Berezhkov meant it. He was determined on having blue eyes. Blue eyes and a shy smile. I had quite a job vindicating my right to describe Berezhkov in my own way, the way I saw him.

Sometimes private readings of my MS were arranged at Berezhkov's flat with his wife and two or three friends as audience. While I read, he glanced at the audience now and then to see how they took it, then, himself carried away by the story, his small eyes would begin to sparkle, he'd smile, entirely forgetting that he had to do it shyly, and his face would begin to glow. I remember how once, in the middle of a sentence, Berezhkov burst out laughing. He threw himself back against the sofa cushions, all but rolling with laughter, his face red with the effort of trying to get something out between the bursts of hilarity.

"It's all true!" he managed to shout out at last. "The things I was up to in those days!"

He sprang lightly to his feet and began a vivid description of the adventures I had just been reading about. I listened, amazed and delighted, to the dozens of new details I had never heard before, to the sprinkling of parenthetical episodes, the surprising imagery. Berezhkov never repeated himself, and seemed to be reliving anew everything he was describing. This brilliance was one of his greatest attractions.

The reading seemed to have passed off well. But the next time I came to see Berezhkov he looked worried.

"You'll have to cross out almost all of what you've read, my friend," he said to me.

"What do you mean? Why?"

"It isn't the thing. That's not the kind of book we need."

"Not the kind of book?"

No. It's much too frivolous. Who cares, for instance, about my New Year's Eve party with Ganshin? Or that tin of enamel paint, say? All that'll have to come out. I've thought of an entirely new plan."

And warming to his theme, he began to unfold his plan to me. I was crushed. A year ago he had insisted on my putting in the tin-of-enamel-paint episode, he had exclaimed so earnestly, "Without it there'll be no novel!" and told the story in such glowing colours that he soon had me enthusiastic over it, and now, when the thing was down on paper, he demanded that it should be thrown out just like that. He now had in mind a most unconventional work of fictionized philosophy about the laws of creative designing.

"Design thinking, the creative work of a designer—that should be the keynote of the book," he said. "All the rest is useless."

I began to remonstrate, but it soon dawned on me that instead of arguing I ought to listen, listen with all my ears, and write down everything my hero had to say about creative work. And that's what I did.

## 2

I should like to give some of Berexhkov's views about literature, about the art of the writer, which he expressed during our arguments.

"I would compare a writer to an inventor, a designer," he said. "Nowadays a design is the work of many people—whole staffs in drawing offices and experimental plants. The division of labour is very widely practised in this field of creative work. A clear line has been drawn here between the major and the minor aspects of it. You can go up to the desks and see what the designer is doing and what his assistants are doing. The major thing here is the idea, the over-all conception, or, as we call it, the preliminary lay-out of the thing as a whole. A designer today, in the thirties of our century, cannot be expected all at once to think out his design down to the minut-

est component elements. The writer handles all the details of his work himself, but with us this is done by the designer's assistants. We have men who specialize in pistons, lubrication, valves and so on and so forth."

I interrupted Berezhkov:

"In fiction writing that's hardly possible."

"I'm not sure. It's quite likely that the great writer of the future will be a sort of literary lay-out man. In the art of the writer, too, I think, you can pick out the primary feature. What is it? You read a book, some splendid novel like *War and Peace*, say, or *Anna Karenina*. As you read you have a feeling that you are climbing up the primary truss of the work, as it were. It's invisible. The writer would seem to be giving you only the particulars, but behind and through it all you feel the presence of this truss and enjoy climbing up it. It's like a railway track to carry the train of the story as it rushes along it. You see all kinds of scenes and views during the journey, but the awareness of that track never leaves you. And so the chief thing in a novel, in my opinion, is the general idea, the design arrangement, which, with us, belongs to the inventor, the designer of the thing. Another good word for it is conception."

"Art is very often said to be made up of particulars, but I don't agree with it," Berezhkov continued. "Art is a whole! The ability to see a thing whole, to conceive it in its entirety, to subordinate all the parts to this whole—that, in my opinion, is the greatest gift a man of art or a man of technique can have."

Linking these thoughts with our disputes about the book Berezhkov said:

"Now what is that primary truss, the track of our book? Creation. The creative work of the designer."

Many of Berezhkov's opinions struck me as being profoundly true, and I agreed with them wholeheartedly. But I had my own conception of the book, a conception which could hardly be said to be covered by the word Creation, the Creative Work of the Designer.

Berezhkov went on arguing his point.

"I believe the secret of literary power could be expressed in a single word—penetration. Generally speaking, talent is the gift of penetration. If you ask me, I call that person a writer who has the power to probe the most hidden depths of his characters. To be able to do that you must have a perfectly clear understanding of what constitutes the essential feature, the core of the character you want to portray. Your task is to get to that core, and bring it out by discarding all that is unessential and extraneous to it, whereas you are letting yourself be diverted by petty details."

I really felt like a sculptor modelling a portrait—many little traits of my sister were so dear to me that I was loath to discard them. Thinking over Berezhkov's words I was reminded of a scene at which I happened to be a witness. One morning Berezhkov was looking through the newspapers in my presence. All of a sudden he gave an exclamation and shouted to his wife in the next room at the top of his voice, "Valya! Here's an article about us! Come here, quick!"

She came in, looking at Berezhkov with a wise, affectionate little smile, the kind of look that is usually reserved for children. The article was promptly read out aloud.

"Charming! A charming article!" Berezhkov declared emphatically. "I dictated the whole thing to a reporter yesterday in five minutes."

He was really tickled to death at that moment, like a child. But fifteen minutes later, when we resumed our usual talk about his engine, about Creation, and the passion of a designer, he said with a nod towards the newspaper that still lay before him.

"That's very pleasant, of course. But that's not what you create a thing for. If that's all a designer works for, then his thing is not worth anything."

Those words impinged themselves on my mind. I realized that they stood for something very profound in Berezhkov's personality—that salient feature, or what he had called the core of character. I understood that this was his real credo. At the same time I felt that if I merely



quoted these words of my hero without describing the scene that led up to them, I would not have shown the real living character of the man.

However, I no longer argued I made notes I now return to those notes

3

The human mind, Berezhikov said, resuming his narrative, is a remarkable thing Nature's most amazing piece of designing I had absolutely forbidden myself to think of any new high-powered engine, I had decided never more to give chase to that Blue Bird, and had sworn a terrible oath wishing my right arm to wither the moment I drew the first line I seemed to have quietened down at last Don't you believe it!

Let me tell you now about the most critical and the most exciting period of my life

One fine summer evening in June 1931, I left for Leningrad on business connected with the Institute. I got into the Flying Arrow train in Moscow with a small convenient suitcase. I suppose you know that glorious feeling of escape, that getting away from the workaday world, and the jogtrot of life, when the train, at last, starts moving and carries you off into some other mysterious and enchanted world.

I could look back with satisfaction at a good long stretch of work done the five-year plan for the aviation industry, in the drafting of which I had had a hand, had been completed and endorsed, the five-year plan for the Institute had been approved, all kinds of estimates and specifications had been drawn up, projects designed and initialed, appropriations, stocks and delivery orders received, and dozens of other routine matters attended to I began to relax the moment the wheels started turning I climbed up on the top berth, where my bed had been made for me, and lay between the fresh sheets, thinking with anticipatory pleasure of the different people I was going to meet in Leningrad—apart from those I was

obliged to meet as a matter of duty. These pleasant meditations were marred by the intruding thought of one particular Leningrader whom I was not at all anxious to meet—Ladoshnikov. I had firmly made up my mind before leaving Moscow not to call on him. If we met, a serious talk was unavoidable. Ladoshnikov would first ask after Masha, then our common friends, and then was sure to ask me a question I decidedly didn't care to hear. Hadn't I sworn, "May my right hand wither," and all the rest of it. One might as well be consistent and say—may my legs wither, too, if they carried me where they shouldn't! But enough of that. To hell with these thoughts!

The coach rocked gently. I got a book out of my suitcase—some adventure story. The little reading lamp over my head threw a cosy light on the page. Not once did I catch myself reading mechanically, my thoughts elsewhere. I read a few chapters with pleasure, stretched myself luxuriously, switched off the light and fell asleep.

Berezhkov smiled.

"While your hero is borne on his sleeping way to our former northern capital, let us, as they say in the old novels, review certain events that took place since the D 21 came a cropper."

4

Shelest was no longer in charge of the Institute, Berezhkov proceeded. He had been offered, as I afterwards learned, to stay on in the capacity of deputy director or a sort of chief consulting engineer, but he declined these offers.

He continued his course of lectures on aircraft engines at the Moscow School of Engineering, was still a member of the editorial board of the Grand Soviet Encyclopaedia, and lately had been made a member of the Engineering Council under the People's Commissar of Heavy Industry. His resignation, as you see, was quite an honourable one. He had not shown himself at the Institute how-ever since then, if I am not mistaken. He had not even

turned over his duties to his successor at the office, but had done it at home.

His duties as director of the ADVI were taken over by a leading business executive, who had just been awarded a government Order for the successful completion of the Volga Aircraft-Engine Plant building project—our old friend Novitsky. This alone went to show that as much importance was attached to the "rearmament" of the Institute as was attached to the major building projects of the five-year plan.

When he first came to us after being appointed, he shook hands with me and said, laughing:

"So there goes my holiday, Berezhkov. I predicted it. I was at the spa in Kislovodsk when I got their telegram asking me to come back."

Nevertheless the short holiday had done him good and he was in better trim. His clean-shaven face had filled out and did not have that aged ashy look. The bags under his eyes were less noticeable. He still dressed in military style—a khaki cloth tunic with a turn-down collar, a broad belt, which scarcely concealed an unmistakable paunch, and immaculate shining high-boots. He intercepted my glance.

"They'll be dusty enough soon," he said.

He was standing by the window, balancing from heel to toe and saying:

"I've just been over our future territory with the planners from the Moscow Soviet. We pegged it down—stuck some fir branches in the ground. So the new town has been laid. It's very pleasant to start your first work day on a new job like that."

He was obviously starting on the building work with genuine pleasure and zest.

"All these little houses will soon come down," he said, pointing through the window. "All this land right down to that field on the edge of Moscow will be ADVI Town. No, we'll give it a new name—CIA City—the Central Institute of Aircraft Engines. How does that sound, Berezhkov?"

"Sounds good," I answered. "It will be a sort of Rubicon. Once we've crossed it."

"Fine. I'm very glad that's what I want you to do, Berezhkov. Will you please let me have your ideas for the experimental plant and for equipping the Institute. Don't be afraid to use your imagination. We've got to look five years ahead. Give yourself plenty of scope."

"That's something I'm never short of," I said modestly.

"You aren't, eh?" Novitsky said, screwing up one eye. "Well, if you overdo it, I'll pull you in a bit."

"That suits me."

"Fine. In that case we'll get along splendidly, I feel. All right, get on with your business, then."

"We're doing practically nothing, Comrade Novitsky. Things are in such a mess."

"Never mind. Give me a week. I'll look into things, and gather in a few loose ends. And in a week's time you and I will sit down to a long and serious talk."

Do you know what he meant by that vague statement about 'loose ends'?

During that week lorries loaded with logs and boards drove in and out of the streets adjoining the Institute, and a boarded fence sprang up, enclosing a large area with houses, yards, front gardens, water-pumps and even a stretch of tram lines. Although it was winter, the tenants of the little houses were moved out to new dwellings somewhere at the other end of Moscow. The lorries dumped their loads of timber into the churned up snow of the roadway and went back loaded up with someone's household goods and chattels. Some of the houses were pulled down right away, others were left to serve as temporary living quarters for the workers. Garden fences and sheds were pulled down. Bonfires of rotten wood and litter blazed high. The whole vicinity around the Institute was in an uproar.

Novitsky came to the Institute in muddy, if not dusty, boots. He set up a second residence in one of the vacated little houses, which soon became known as "Novitsky's office." One cannot but give him credit for his energy.

That same week he organized a Building Department. We had to make room for it in the drawing hall by giving up half our floor space.

During those days Novitsky greeted me from a distance or just exchanged a few hurried words with me. But one fine morning he invited me into his private office

5

It was the same old room, furnished in Shelest's taste, where I had been such a frequent visitor. The same upholstered leather armchairs stood at the massive desk, the parquet had the same high polish, and the same carpet lay on the floor. Behind the glass doors of the bookcase stood the same reference books, encyclopaedias and dictionaries in Russian and foreign languages. The only changes in the room were a drawing missing from one of the walls and a black overcoat and black winter cap hanging on a nail. Novitsky usually came up here by way of the backstairs, which was a short cut, and took his things off here. A box of expensive cigarettes lay on top of some papers on the desk. A glass of tea, which had obviously gone cold, stood there too. A nickel-plated electric kettle stood boiling on the window-sill nearby.

"This is like camping out," said Novitsky. "Sit down. Have some tea?"

"No, thanks."

"I'll have a glass, if you don't mind."

He got up, emptied the cold tea into the slop-basin, poured out some hot tea and put sugar in. I glanced at the desk and suddenly saw the notebook containing the design data of the D-24 engine lying there opened at the title-page. I wondered why he had dug it out. What was there to say about an engine that was dead and done with? A writing-pad lay open on the desk with notes in a scrawling hand made with blue pencil. I could make out various numbered paragraphs—one, two, three—and by straining my eyes, could read the top lines.

"See Berexhkov re.

1) D-24 "

Odd. What could it mean?

Novitsky came up to the desk where I was sitting

"Looking at it?" he said, sipping the steaming-hot strongly brewed tea "Sit down."

He sat down facing me, put the glass down, reached for the design and moved it over to the edge of the desk.

"Well, what are we going to do about this thing, Berexhkov?" he said

"I don't know. The question has been decided, as you know. She's lying in the shed under lock and key."

"Yes, I've been there, I saw her. Dumped there in a corner. Rather wasteful that, isn't it?" Novitsky took another sip, and lit a cigarette. "Of course, there's no turning back, Berexhkov. That's all done with. I suppose you realize by now that this"—he tapped the design—"this was romanticism. A dream idea."

I was silent. Settling comfortably in his armchair and puffing at his cigarette, he went on.

"I'm glad you understand that. I may as well tell you now that I was against having the Volga plant toolled up for your engine from the very start. We should have gone to the Varangians straightaway. But they didn't listen to me."

He spoke with a friendly, rather lofty tolerance, as though trying to teach me sense. I thought of the ironical smile he had worn at the conference on the high-powered engine two years ago, when he declared, "I'd prefer to start with a foreign model." Had he really been wiser than anyone else then, more far-sighted? I could scarcely contain myself from exclaiming, "What were we to do then—just nothing?"

"They didn't listen to me," Novitsky proceeded. "More's the pity. Spoiled the works. It was toolled up for one engine, and now we're going to turn out another. It means re-equipping the works, putting in a lot of new machine-tools."

"What tools?" I asked.

The Volga works was hopelessly lost to our D-24, yet I couldn't help thinking of it with a pang of curiosity. Novitsky, too, still couldn't get the thought of Motorstrol out of his head, and he told me about the new machinery that had been bought for the works in a rather peeved tone of voice before dropping the subject.

"We have cares of our own now, Berezhkov. What are we going to do with this inheritance, eh?"

He picked up a big blue pencil from the desk and tapped the design again.

"As far as I know, these are its weakest points," he said, pointing the pencil at the valves and some other parts. "Have you thought of radically solving the problem simply by making the whole thing heavier?"

"I have. It's hopeless."

"Why?"

"Because well, you know as well as I do. It means changing all the dimensions. It would be too heavy."

"Well, why not? Why not make an engine for a hydroglisseur? Our naval men would build such beauties if they had this engine. I paid them a visit and explored the ground already. What about tackling this, Berezhkov? Let's save the engine, eh?"

"For a hydroglisseur?" I murmured.

I saw in a flash that Novitsky had hit upon the only possible solution for dragging the engine out of its grave. Naturally, it wouldn't be the thing I had dreamt of, it wouldn't be an engine for our aviation. But those dreams were done with. Here was something real. With an engine like that—yes, it *could* be reinforced—our torpedo boats would fly like bullets. Clever chap, that Novitsky!

He had the design on his knees and was roughly reinforcing the vulnerable spots by going over the outlines with a blue pencil. Then he turned over the pages, stopping here and there to comment on the modifications which this reinforcement would involve. Using the same pencil he corrected this or that drawing, made question marks and notes in the margin with a firm hand. I began discussing the idea with pleasure. You felt you were deal-

ing with a fully qualified specialist and a shrewd energetic man to boot

He slammed the notebook shut and said

"This clears our prospects up, Berezikov. We know where we stand now. We'll put this through the State Planning Commission, have it included in the Institute's five year plan."

He crossed out the denomination on the covers and wrote instead GD-24—the GD standing for Glasseur Engine.

"That's settled one of our problems," Novitsky proceeded, handing me the notebook. "I leave the job to you."

I readily accepted it. I looked at our new director with respect. This was an absolutely real thing! So now I'd have two engines to my credit—the sixty h.p. tractor engine and this one for the glasseur. Not so bad!

6

"My second question concerns the Institute's five-year plan," Novitsky said. "As far as your department is concerned it simply doesn't exist."

"Yes, that's true, Comrade Novitsky."

"We shall have to draft it, then. By the way, an important commission is going to start work soon on the revision of the five year plan for the whole aviation industry. All the factories are taking on extra obligations. Where does our Institute come in? What are we going to give our industry during that period?"

"Do you have in mind a high powered engine?" I said uncertainly. "But I just can't imagine—"

"Can't imagine what? The problem is perfectly clear, in my opinion."

"I don't know. If I were asked just now to design another high powered engine—I just don't know, Comrade Novitsky. The thing is anything but clear to me."

"In my opinion the problem is perfectly clear," Novitsky repeated. "What are we building the CLA City for



putting millions into it, if not to seriously tackle the problem of a Soviet high-powered engine. We'll go about that job in a really serious and thorough manner, without premature attempts to scale the heights of engineering with bare hands. First we'll build our new factory-institute, and then only shall we . . ."

I listened and nodded agreement. The way he put it the problem did really begin to look clear.

"We'll have our high-powered engine in the next *pyatiletka*," he continued. "And it won't be a gamble, there'll be no hysterics, no jerks, this time. And we'll beat everyone else to it."

He mentioned the work Makeyev and Nikitin junior were doing. Great technological difficulties had arisen in the process of construction of their D-25 engine, which was based on an interesting design formula of maximum flexibility. As with us, the development of the engine had been dragging on for years.

"So we've got to take other obligations upon ourselves in this *pyatiletka*," Novitsky said. "Industry has got to feel that our institute is doing something for it."

We mapped out several serious tasks, among them, the alteration of the Hispano, which was still being manufactured at one of the plants, to an air-cooling system. Together with the GD-24, this would keep my department pretty busy.

"These will be our proposals for the *pyatiletka* commission," Novitsky said. "At least it's something real."

He smiled again in that patronizing way which I somehow vaguely resented. Did I realize then that Novitsky, that undoubtedly capable and efficient man, was not entirely "up to scratch," to use a professional idiom? I really don't know. For all his primary virtues he obviously lacked what he called romanticism, the lift of wings, daring imagination. But in those days, as I told you, I, too, had abandoned my daring dreams. And so I took it all in without a murmur.

"Concrete deeds will be demanded of us, Berezhkov," Novitsky said. "We'll be expected to fulfil the plan which you and I are going to sign and which the government

will endorse. Once we've let ourselves in for it we've got to see it through and take full responsibility. That's our rule, Berezhkov."

"A splendid rule! I agree with you absolutely, Comrade Novitsky."

"That settles question number two then. You won't have any objection, I hope, if I ask you to represent the Institute at the Aircraft Commission of the Gosplan."

"Not at all," I answered with dignity. "Our line is perfectly clear to me."

Next we passed over to the third question, which was, I should say, the most interesting to both of us, namely, the project for our future vast Institute, our experimental plant. I had a number of suggestions prepared in advance. We went into them. Novitsky approved nearly all of them. Apart from the plant, we planned about a dozen laboratories. Some of the equipment—things I had had in mind for some time—was to be designed and constructed locally at the Institute. This meant one more extra job for me. We also drafted a preliminary schedule for making the designs.

I came out of the director's office, where we had been closeted together for close on four hours, with a firm step. Under my arm was the D-24 notebook with the covers crossed out in blue pencil and the new title written in large letters, and, my own paper-case containing various sketches and memoranda, some in my handwriting, some heavily pencilled in blue.

The low winter sun shone straight into my face through the window at the end of the corridor. I thought it a good sign. The long strip of carpet ran out before me like a trail. With the sun in my eyes I couldn't see where it ended, it seemed to be lost in the distance. That, too, could be a good sign. I strode along. Was the floor springy underfoot, I wondered. No, it wasn't. And thank God it wasn't. I'd had enough of springy floors and pavements. That was all gone and done with.

What are you looking at? Waiting for some "all of a sudden"? No, that day when Novitsky primed me up to

keep me going for a year or two, I believed—nay, more, I was convinced—that I was guaranteed against any possible “all-of-a-suddens”

7

And now, before passing on to the event I am about to describe, I'd like to touch briefly on one or two details

The first is a purely lyrical one. When I came into my office after leaving Novitsky's, and put down on my desk the notebook with the design data of the engine, which I had believed struck out of my life, which I had forced myself to stop thinking about, and which no amount of alterations could ever revive as an aircraft engine—when I put down the notebook, turned over the covers, and again saw my creation, a host of memories flooded my soul. It all came surging back to me again—the ecstasy with which, shut up in my room after the meeting at Rodionov's, I had sketched my lay-out; the song of the Rich Guest from *Sadko*, which we had sung here at nights when “pitching into” the project, New Year's Eve, spent at the side of the roaring engine out in the frost; the glass I had raised aloft towards the starry sky, where D-24-powered machines would wing their way. No, they wouldn't. The powerful Soviet planes—Ladoshnikov's plane—would be powered by engines which had the foreign mark LMG on them. They had already been given our own number—D-30 and were being put into quantity production at the Volga plant.

The drawings of that engine lay in my desk. I had once studied them, scrutinized them in an attempt to fathom where the foreigners had beaten me. I got them out again and spread them on my desk. No, you can say what you like, you can cut me up in pieces, but I'll never agree that that design is better than ours. It was as clear to me as ever that in comparison with the D-24, this latest wrinkle was obsolete design thinking, it had no future, because. . . . But what's the use of talking about it. In this thing the test stand had the last

word and there we were beaten. The LMG designer proved the better man not by reason of any depth or brilliance of conception, but . . . But what? Europe had a highly developed technique, an up-to-date engine building industry, whereas we were creating our engine without them, creating it in the face of tremendous odds. Shouting wouldn't help us—we had lost. I was reminded of Maykovsky's line "I yell, but can't prove anything."

Neither can I. So what's the use of yelling? Or whimpering, for that matter, whimpering here on the quiet with nobody to hear you. But damn it all, it wasn't a question of my own personal happiness, was it?

The crux of the matter was this. Our splendid aviation, which had so many brave and talented fliers, and which, in the works of Nikolai Zhukovsky, had given the world the theory of aeronautics, would have its wings clipped until such time as we were able to give it aircraft engines of our own fabrication.

The whole country had taken an immense running jump, leaving behind it thrilling landmarks in the shape of construction projects with such names as Magnitogorsk, the Dnieper Power Station, the Stalingrad Tractor Works, the Gorky Motor-car Works, the Uralmash, and so on, while here, in this field, through the fault of us aircraft-engine designers, the *pyatiletka* had a yawning gap in it. This lack of powerful aircraft engines would be felt by the Soviet Union at every step.

Novitsky, that day, had laid down the Institute's line: "We'll have our high-powered engine in the next *pyatiletka*." And I had agreed with him. But here, in the seclusion of my own office, I groaned inwardly. My God, the next *pyatiletka*! Would we have to wait so long? Couldn't we think of something? But what would thinking help when we had no industrial base, no factory facilities? Yes, the first thing to do was to build the Institute's experimental plant. There was no other way. To hell with whimpering!

I drove all thoughts of my ruined engine from my mind, stuck them away in some hidden drawer and turned the key on them. Then I turned the key in the

literal sense, and stuck the LMG designs back into the drawer I didn't want to see them

Now let me tell you how we commemorated the 17th of March, 1931, the tenth anniversary of Zhukovsky's death. Shortly before that date Andrei Nikitin rang me up on the telephone. I forgot to tell you that he had been working in the Institute for a long time already and had recently been elected Secretary of the Institute's Party organization. He was an excellent calculator-mathematician. His brother, I was told, jokingly called him a "late star."

The 'phone call was unexpected.

"Comrade Berezhev, will you please drop in at the Party bureau," Nikitin said. "We're planning a Zhukovsky memorial evening."

I went at once. The room of the Party bureau was a scene of animation. They were preparing a rough draft of the evening's programme there. Nikitin, on behalf of the bureau, asked me to speak on "Zhukovsky and Russian Engines."

"So that's the ideal!" I intoned, and laughingly explained that that was the tone Zhukovsky often used. The recollection brought others in its train: the square little ink-bottle with its plain cork, the cheap school pen, which Zhukovsky used, the sheets of paper spread all round, sometimes even on the floor, hundreds and hundreds of sheets covered with his large handwriting. I spoke about these and other reminiscences of Nikolai Zhukovsky, while the young people, friends with whom we had been through so much together, were ready to listen to me without end.

"Talking about this is one thing," I said. "Will I have time to prepare my report, though? It's quite a bit of research, and practically none of the materials have been published. I shall have to dig them out."

"We'll help you, we'll get them for you no matter where they are," Nikitin said. "What we need is a report that would strengthen everyone's faith in the idea of a powerful Russian engine."

I looked at him closely. Was he aware, this big, broad-

shouldered Secretary of the Party bureau, whose unruffled calm conveyed such a powerful sense of hidden strength—was he aware of my heart searchings? He answered my glance with a smile.

"Zhukovsky believed in it, didn't he?" he said.

"Rather!" I cried. "Just a minute, my friends, just a minute! Why, he told me himself that he was going to write about the engine which Ganshin and I had designed in his course of mechanics. He didn't finish that book, but he must have left some notes, some sort of plan or other. We've got to find them. And then—"

Suggestions were made on all sides.

"Comrade Berezhkov, you must get hold of Zhukovsky's letters to Makeyev about the engine for the 'Ilya Muromets' plane."

"And Zhukovsky's article about the theory of jet-propulsion? You ought to work up the theme of 'Zhukovsky and Tsiolkovsky'."

"And personal reminiscences. Especially reminiscences!"

"I'm on, friends!" I declared. "I'm swamped with work, but I'll manage it somehow."

We sat on, talking about Zhukovsky and how best to honour his memory.

The next day I went to the Central Institute of Aeronautics and asked for Zhukovsky's MS about our Adros, which I had handed in myself there years ago. My God! The only thing I remembered about that work had been the equation, which I had looked up like a schoolboy hunting out the answers, and afterwards made practical use of. Why, the thing was chock-full of revelations! The study of Zhukovsky's materials, some of which, as I have already said, had not been published, not only helped me make up my report but acted as a spur in what I did later.

## B

I already told you with what a pleasant feeling I undertook this journey. Everything which Novitsky and I had mapped out several months before had been ap-

proved by the *pyatiletka* commission and incorporated into the Institute's five-year plan. This included the glisseur engine, the air-cooling modifications to the Hispano, and a number of other designing jobs. During those months we made the drawings of the GD-24, and the project had already been examined and approved. The Institute's plan provided for no high-powered engine. In the general press of business I hardly ever gave it a thought. At least, so it seemed to me.

Some of the orders for our Institute's equipment were being urgently fulfilled in Leningrad, in the process of production certain difficulties arose, and points cropped up that needed clearing up, and I was going out to settle these on the spot, I was also taking some extra drawings with me. Besides this, I had been entrusted with a sort of diplomatic mission—I was to interview three or four Leningrad professors with a view to enticing them over to our new Institute.

During my first day in Leningrad I got through quite a good deal of work. I visited the Engine Works and spent some hours usefully at the Polytechnical Institute, where I saw some people I had to meet. In a word, I was as busy as a bee. Nevertheless, in the midst of it all, I picked up the telephone in one of the offices where I was waiting to be received, and forgetting the oath I had taken only the day before ("May my legs wither!") gave Ladoshnikov's number. We arranged that I would call on him that evening at his flat in Kamernooostrovsky Prospect.

"With your permission, then, we shall pass directly to that scene.

Ladoshnikov met me in the hall and ushered me into his study. The surroundings in which I found myself bore little resemblance to that room in the timbered little house in Ostozhenka, where Ladoshnikov had studied the laws of aeronautics by trying to make snapshots of a captive fly with the aid of a home-made camera. Stepping over this waxed parquet floor, and glancing at the orderly arrangement of the sedate-look-

ing furniture, I found it hard to imagine a fly blundering into this well-appointed Leningrad apartment.

Ladoshnikov and I had last met at the New Year's Eve party at Granshin's. That was over two years ago. During that time I had had my rise and my fall, had since fully recovered from my failures and even fore-sworn all future flights of fancy, but the host avoided the subject of my affairs. He cordially sat me down in a deep leather armchair, settled himself into another and started to ask me about Masha.

Ladoshnikov was as steadfast in friendship as he was in everything else. Paintings which my sister had given him hung over his desk in simple but expensive frames. In the centre, making a bright splash of colour, was the huge bunch of autumn leaves which the artist had painted from the golden bouquet Ladoshnikov had presented to her before leaving for Leningrad.

"Tell her I haven't forgotten her lessons, Alexei. Let me show you something."

A heavy cloth bound sketch-book was produced from the depths of a bookcase. Drawings, innumerable sketches by pencil and pen were made with a sure hand on thick drawing paper. Propeller, wings, landing gear, altitude controls, tail unit, the entire airplane—one-engined, long winged, powerful. Ladoshnikov apparently had now fully mastered that peculiar art of technical drawing. I couldn't help admiring this new creation of his, which so far existed only in the sketch book, and only the fear that this might bring up the subject of my own plans checked me from expressing it aloud.

Ladoshnikov put the sketch book back into its place, muttering, "That's another one on the shelf."

I did not ask why the new LAD was to lie on the shelf, but went up to the wall and evinced a sudden interest in a small landscape done in oils. The Orekhovo pond. . . Masha had often gone there to sketch. Green tinted water, duckweed clinging to the clayey bank. It was there, on that bank, pottering with my outboard motor one hot summer day, that I first made the acquaintance of Ladoshnikov, the lanky student in the dusty high-boots.



"Shouldn't be surprised if you invent a motor of your own" In those days I had nerve enough to answer back, "You bet I will!"

I was studying the dark smooth surface of the Orekhovo pond when Ladoshnikov's wife came in

"Let me introduce you, Alexei—Ludmila Karlovna"

She was a tall attractive woman. Well-dressed, too. That may have been on account of the visitor, but I rather think she cultivated the habit. Obviously, she was the soul of that well-regulated household. Even Masha's paintings, I am sure, had been hung up where they were by the hostess's hands

"Dinner is served," she said.

I nearly fell over a huge dog, who was following his mistress about, and mentally cursing myself for a clumsy ass, effected a dignified entry into the dining-room. Massive old furniture, everything gleaming and spotless. Evidence everywhere of a measured regulated rhythm of life. I made some polite inquiries as to the dog's pedigree, and sat down at the table where I was told to

Frankly, I was anxious to make a good impression on Ludmila Karlovna and find favour in her eyes. I gave two or three lively pictures of Moscow life and was rewarded with a smile, tempered, however, with some critical remarks about the hurly-burly existence of the Muscovites in comparison with the more staid "Petersburgians"

Ladoshnikov chuckled now and again and saw to it that my glass did not stay empty. I proposed fairly witty toasts and was getting on pretty well. The hostess asked me about the work I was doing under Novitsky. To show that I was a man of character, I told of the oath I had taken never to go in for castle-building any more.

"May my hand wither .."

For some reason my hosts did not laugh. But neither did they argue or remonstrate. But after a while Ladoshnikov suddenly pushed his glass away and said

"Perhaps you are right to back out of it, my dear sir"

This expression of Nikolai Zhukovsky's pointed at me

had an instant sobering effect upon me. The conversation flagged. Presently your "dear sir" wished his host and hostess good night and slunk off to his hotel.

9

The next morning was a busy one for me. I visited several places and found time, between business talks, to admire the beautiful city and bask in its soft July sunshine. I tried to forget yesterday's visit to Ladoshnikov. A high powered aircraft engine was farthest from my thoughts.

But, I repeat again, my friend, the most wonderful construction in the world is the human psychology. Judging from my own experience, there is a law governing creative work, which I call the "law of the wound-up spring." Revelation is really something like the recoil of a wound-up spring, which acts in a matter of seconds. If you have been working hard on some problem, spent a long time thinking over it, and done a good deal of research in connection with it, you will have been winding up the spring of your creative faculty. Afterwards you will have finished with that problem one way or another either by solving it, or, on the contrary, giving it up, acknowledging defeat, dismissing it officially from your mind (Berezhkov actually used the expression "dismissing it officially"—and so we let it stand). Nevertheless, the tightly coiled spring goes on doing its work; the subject is still being explored in some hidden cell of the brain, somewhere out of focus, out of one's field of vision, maybe somewhere in the subconscious.

And what is most important, this spring kept winding itself up again inside me. Try to picture the atmosphere of the time, which I have repeatedly tried to convey to you. A powerful engine—a high powered Soviet engine! Although I had temporarily given up the dream of creating such an engine, I was always hearing about it. Rodionov, for one thing, mentioned it whenever we met or whenever he made a speech. What is more, Zhukovsky's

unpublished researches, which I had recently delved into, pointed the same way. It had been a sort of keynote at the Zhukovsky memorial evening too. It had been discussed again and again at all the numerous meetings devoted to the drafting of the five-year plan in which I had been a most conscientious participant. The very air was electrically charged with the country's pressing need for such an engine.

Apparently, throughout those six months since the D-24 was given up as a hopeless case, the spring of creative endeavour, wound up tight within me, had been doing its work.

## 10

On the fifth day of my stay in Leningrad I went down to the Communist Works. I spent a leisurely hour in the private office of my old acquaintance Ivan Makashin, chief of the drafting and design office. It was a very pleasant meeting, and we chatted, joked and laughed.

After that, still in the best of moods, I went for a ramble through the works. I came downstairs into one of the shops. What's this? Next to the window, on a stand, was a half-stripped aircraft engine. I took a good look at it. What the devil! If it wasn't the LMG—my enemy, my hated rival, to whom the works on the Volga, built specially for the D-24, had been turned over! Was this a factory sample, I wondered. Yes, it had our stamp on it—D-30.

We had not received new engines for investigation at the Institute for some time, as our old testing station was undergoing reconstruction. I had made a thorough study of this German engine from the designs, but this was the first time I saw the actual D-30.

I just stood there staring at it, trembling with excitement. And would you believe it, a single glance at that engine was enough to touch me off. The effect of it was like the striking of a percussion cap of a shell, or, if you like, of a spark falling into a gunpowder barrel, when you get

an instantaneous release of all the potential energy locked up in that innocent looking powder

It suddenly struck me that the new engine had to be constructed on the basis of the D-30. No, that's not quite right. I should have said on the basis of the machinery that was being used to manufacture the D-30. What's the use of dreaming of an engine of our own or trying to design one when we haven't got a modern industry. I used to think: Who said we hadn't? Hadn't this engine, this damned LMG, been produced at our own Soviet works!

You may ask, why is it we couldn't turn out the D-21 design on the basis of the Volga works, yet we can turn out a new thing? I saw it clearly. It was because the D-21 hadn't been developed. We had failed to develop it because we didn't have real good factory facilities. And in the two years we had wasted trying to develop it, the thing had grown obsolete. Now when I stood face to face with the actual production tooling for a new engine I realized that it would also provide the facilities for developing it. A correct premise always leads to remarkably correct conclusions.

I repeat, the problem of this new high powered engine had probably been working itself out in a vague fragmentary sort of way somewhere in my subconscious mind, but it was only there in the shop, standing in front of the LMG, that the idea first burst upon me in a blinding flash.

## 11

What did I use from the D-30? Just one thing—cylinder capacity. Optimum displacement volume for large and powerful engines had been indicated by Professor Shelest after long and careful investigation. The D-30 had just such cylinders. Everything else in that engine I rejected. It had been clear to me before that its lay-out, its very conception failed to express up-to-date and progressive trends in engineering. The potentialities latent in large cylinders had not been brought out or utilized. The D-30 developed 1,800 r.p.m. Not enough! Much less than it

could be made to yield if      Yes, I was already seeing the thing in my mind's eye. The cylinders of my enemy did not form a compact group, but were arranged separately with rather cunning fastenings. Down with these cunning devices, to hell with the whole arrangement! A bank, a single piece of metal—that was what the basis of my new engine was to be. I saw the shape of it at once. Oho, that would build up the revs all right! 2,100! 2,200! I could already envisage the thing in detail, even down to the smallest parts. I remember I almost let out a yell when I suddenly got a mental picture of a single block-cast construction for the head of the engine. There was the key, there was the solution of the whole problem! I immediately saw that head in the form of an intake pipe convenient for the release of the gas. Oho, that's making the main shaft turn all right! What about borrowing a few ideas from the Adros? In a flash I saw the MS of Zhukovsky's researches which I had recently reread. Oho! Two thousand five hundred revs! Even more! Nearly three thousand! The construction's joints would not stand such a strain. I'd have to give it still greater rigidity, then. Standing there in a sort of stupor, I suddenly saw a way of stiffening the head fastening. It would be secured to the crankcase by means of hold-down bolts. Yes, an absolutely original design, resembling no other in the world, stood before my eyes. It was neither American nor German, but our own Russian Soviet engine capable of building up over two and a half thousand revs, that is to say.      That is, an engine of one thousand h.p. Why, it was a leap, a real leap in aircraft-engine designing. The most powerful foreign models then in existence—all those Typhoons, and Leopards, and LMG's—had an output limit of 800-850 h.p. Could this      could this be. It with a capital I? And did we really have factory facilities now for building it and seeing it through its life-acquiring stages? Yes, we did! There was a factory existing and operating on the Volga. And it was this, this of all things that supplied the key to the solution, gave meaning to my idea.

I stood there for a while dumbstruck, listening as it were to my engine building up a crescendo of harnessed fury. Would it stand such a power output? Wouldn't the bolts burst? No, there wasn't a weak spot anywhere.

12

And then, forgetting completely what I had come there for, what business errands I still had to attend to, I went upstairs again. I remember going back into Makashin's office and saying mechanically, "Good morning."

Makashin looked at me in surprise.

"Same to you. Haven't seen you for years."

"I want to ask you a favour, Makashin."

"Go ahead. What's the matter?"

"Nothing. I just want to do a bit of drawing. Can you let me have a drawing board?"

"Is that all? I'll fix that in a minute."

As it happened one of the engineers of the design office was ill that day, and Makashin took me into the drawing room and gave me a desk near the large open window.

"D'you want a set of drawing instruments?"

"No, thanks. Just a pencil and paper."

I tacked a large sheet to the board and started drawing right away. In an ecstasy of creation, with tingling ears and burning cheeks, absolutely blind and deaf to all around me, I blocked out all the sectional drawings of the engine, transferring the thing from my imagination to paper without once using an eraser. After a while my glance fell upon my hand which was holding the pencil. My God, to think that not so long ago I had taken that terrible oath, and repeated it only the other day at Ladoshnikov's. "May my hand wither, if . . ."

But it hadn't withered.

A jumble of irrelevant visions flashed through my mind as I stood there drawing. Here was Rodionov shaking my shoulder when the aeroaligh swept out on to the smooth snowy expanse of the Volga and we saw the factory chimneys. There was Rodionov again, his lean face

flushing with credulous joy when I came running to him in despair, making him believe for a moment that I would find a way out, and that we would not have to switch the Volga works over to the manufacture of a foreign model.

Leningrad's white night closed in around the window before I was aware of it. Makashin, who had been detained at some conference, looked in late in the evening. He found me all alone in the huge drawing room, dead to the world, or, as he afterwards delicately expressed it, looking a bit barmy. He said he had called my name several times, but what brought me to myself was a queer inarticulate sound behind my back. It was an exclamation of astonishment emitted by good old Makashin when he glanced at my drawing. He saw the line lay-out of a high-powered engine with a block-type head and hold-down bolts, an entirely unorthodox design of simple, smooth, naturally rounded and flawless lines.

"What's that?" he gasped.

"A thousand h.p. engine."

"But . . . but when did you do it?"

"Today."

He didn't believe me. He doesn't to this day.

13

"D'you mind if I stay on here a bit, Makashin?" I asked.

"Did you have your dinner?"

I recollected then that I had been invited to dine with some friends.

"No," I said. "What's the time?"

"It's past eleven."

"As late as that?"

I'd have to ring up at once and apologize, I thought. But the very next moment that good intention was clean forgotten. I only remember staring at the telephone and wondering what I was staring at it for. Then again I plunged into the imaginative world of my own creation. I have no further recollection of what Makashin said to me, and how and when he went away.

I was brought out of my absorption again by the same inarticulate sound behind my back. It was Makashin again, expressing his amazement. He had been home and come back bringing me something to eat. He couldn't believe that I had managed to draw so much since he had left me. That good fellow and splendid engineer belonged to a class of designers who think that line lay-outs are eggs that have to be "hatched out" at the drawing desk after months of sitting.

Of course, there is that style of design thinking. Design ideas originate in all kinds of ways. But there is, in my opinion, a single common rule that if you haven't done preliminary thinking, if the design idea hasn't penetrated to the innermost recesses of your mind, if the spring of your creative imagination has not wound itself up, then there will be no result.

Well then, by the morning I had all the cross sections ready. I took a nap in Makashin's office for an hour or two before the staff arrived. Half the factory personnel ran in during the day to have a look at my lay-out. Disputes arose as to whether I had solved this or that problem correctly, for instance, the construction of the main shaft, the head, the system of fastening, the valves, and so on and so forth. While listening and arguing, I began to feel the thing as a living part of me, which grew clearer and clearer.

Let me tell you that life has cultivated in me a trait of character which I consider most beneficial to an inventor or a designer—a trait that is common to Soviet engineers at large. When a fellow-worker comes up to my desk, I never want to hide my drawing from him for fear he will steal some of my ideas. I'm always glad to get different opinions on my work. I understand how much the actual process of talking and arguing about his work means to a designer. Your idea, which you have seen graphically or as a concrete thing, now acquires tangible shape in words, and this helps to verify any gaps or obscurities. In talking and trying to put your ideas into words, the various difficulties and complexities begin to stand out



more clearly, and sometimes new aspects of the problem reveal themselves. Sometimes before deciding anything or making any drawings of the thing I have in my mind, I'd pick on the first of several solutions that occurs to me—maybe one that is obviously no good—and go to my colleague, saying, "Look here, old chap, what do you think of this idea of mine?" and tell him about it. Naturally, he'd say, "This and that are wrong." I know myself they're wrong, but he gives me his reasons, and deals with the matter in quite a new and individual light. It's in talks like this that I clarify my design ideas.

Ladoshnikov used to say that it was only shallow people who were afraid of competition. Men of real creative worth appreciated the value of direct intellectual contact with talent of any kind, because this only tended to enoble and purify their own talent.

14

The first thing I did when the drawings were finished was to have a good sleep. The next morning I rushed off to the flat in Kamennooostrovsky.

Ladoshnikov's wife received me. All dressed up and done up, she tried politely to make me understand that her husband was never at home in the daytime.

"Then where is he?"

"All I can tell you is that he is probably out of town."

"Out of town? Can I ring him up?"

"No."

What rotten luck! The hall mirror showed me what a man who has received bad news can look like. It was a most tragic spectacle, especially as the man in question stood there rooted to the spot, hugging a fat roll of drawings, which is, I believe, the classic pose for an inventor.

I walked straight into the room without waiting to be invited, and sat down. The unruffled calm of that Lenin-grad lady was maddening. What could Ladoshnikov have seen in her? Standoffish female with the blood of a fish.

The next moment, however, I was obliged to change my opinion. As soon as she heard the words "high-powered engine," that woman was completely transformed. She made me recount the events of the last few days, then made an energetic attack on the telephone. In the end she called out a car and we both rode off to look for Ladoshnikov. On the way she told me, "Mikhail said one could never tell what you'd be up to."

And those words, coming from her lips, sounded like a compliment.

15

Ludmila Karlovna drove me down to the check gate of a flying field, which I assumed, belonged to the factory that was turning out the LADs. At first I was refused a pass. The duty officer, on being called out to the gate, told me that Ladoshnikov was not available at the moment, as he was watching demonstration flights, and it was strictly forbidden to disturb him at such a time.

I swore that I wouldn't disturb him and would sit and wait as quiet as a mouse until he was disengaged. Ludmila Karlovna put in a word for me too. Between us we broke down the resistance at the check gate, and I was given a pass to go in. I was directed to a two-storeyed house, which, judging by the amount of glass it had, must have been very light inside. Presently I found myself in the waiting room—can you imagine, they had that everlasting waiting room even there, at the airfield—and I walked straight past the bewildered secretary and entered the private office of the head designer.

A large, not to say huge desk stood by one of the windows. A little way off there was a sloping drawing desk with paper tacked to it. There was nobody at either desk. Where was Ladoshnikov then? At last I saw him through the wide-open door that led on to the balcony. He was sitting on the balcony, lounging comfortably in a light wicker chair with his long legs stretched out. He had a pair of powerful prism binoculars in his hand, and did not hear me come up. He looked much at his ease

and seemed to be just doing nothing but gazing out into the distance. It made me think of Zhukovsky, who used to come out into the garden every morning at Orekhovo and sit on the bench just like that. That was how he began his workday. Gazing out into space, he would just let his mind run slack.

All of a sudden Ladoshnikov raised the binoculars to his eyes. I saw the speck of an airplane in the blue sky. Obviously Ladoshnikov was watching his new machine being tested. I stepped out on to the balcony.

"Sorry to intrude, Mikhail. But something's happened, you know, something."

"Something terrific?"

Ladoshnikov, if anyone, knew how many mare's nests I had found. I had told him myself how I had once gone to see Shelest with the drawings of a wonder gas turbine and come away with the offer of a job as junior draughtsman in his office. But just now I chose to ignore Ladoshnikov's irony.

"That's right! I've designed a thousand h.p. engine."

"In one day?"

"Not exactly. A few days. But the solution came in a flash, you know."

"All of a sudden?"

Himself a methodical worker all his life, Ladoshnikov had never known these "all-of-a-suddens." But there was nevertheless an undertone of something other than mockery in his voice. He looked at me differently too, not at all like he had looked at me at home, when I had repeated my oath to him. I unbosomed myself completely. I told him how I had come to the Communist Works, how I had glanced at the foreign engine built on the Volga, how I had stood there dumbstruck, seeing visions of the new engine.

"Come over to the desk, I'll show you the drawings," I said.

Mikhail got up and looked at me from under his brows.

"All right, show me your drawings."

I first spread the general view of the engine on his huge desk, then demonstrated all the sectional drawings.

one after another Ladoshnikov examined each one carefully. I tried to explain things here and there, but he checked me every time with a growled, "That's clear."

Finally, the last sheet of paper had been laid down. I waited breathlessly—what was Ladoshnikov going to say? He looked up. My God, his eyes—it was such a long time since I had seen them so—his eyes were wide and shining!

"Do you want to know my opinion?" he said. "I hardly have a right to give it offhand, but since you ask me, I think you ought to fly back to Moscow this very day and report to Novitsky."

It was my turn to smile.

"Today?"

"Yes. I'll give you a plane."

I must have looked very silly, and all I could think of saying was

"But I must get my travelling certificate signed somewhere."

"That's no problem, we'll do it for you here," Ladoshnikov said.

And would you believe it, inside of two hours I was flying to Moscow in a two-seater LAD-3. The LAD designer saw me into the cockpit himself.

## 16

In Moscow I rang Novitsky up from the airport, and found him in his office.

"Comrade Novitsky, I'm back."

"Why so soon? Something important happened?"

"Yes, very important. I'm speaking from the airport, and I'm coming straight down to see you."

"All right. I'll send the car for you."

"No need to. I'll get there quicker in a taxi."

"Is it as urgent as that?"

"Yes, very urgent."

"All right. I'll wait for you."

With suitcase, brief-case and a long roll of drawings tied together with a bit of string, I squeezed myself into

the first car that came along and rushed off to the Institute.

There again was our street with a new mile-long wooden fence running down it, there again the entrance door of the Institute, the hall, the wide staircase, the door of the director's office on the first floor. Novitsky did not use that door, though. Covered with felt under a facing of oilcloth to keep the cold out, it was now kept locked. A new door led into his office from an adjoining room in which Novitsky had set up his secretariat and waiting-room.

His room, too, had changed. The writing desk had moved over to the side wall, and he had a new aviation-steel ink-stand and several files and books laid out on it in perfect order. Some of the books on the table were bound volumes of typescript entitled *Building Plans*, *Five-Year Plan of Aircraft Industry*, etc. The bindings were handsomely done in gold edging. Obviously, someone had gone out of his way to please the director. No more caps hung on nails, no electric kettles stood on the window-sill. Novitsky now had his tea served from the waiting-room. Over the desk hung a framed ground plan of the new Institute. Building work could be seen through the window.

Novitsky was dressed differently, too. In place of his usual army-cloth tunic he was wearing a loose summer duck suit. During the six months that he had been in charge of our institute, he had got through a good deal of hard work and had made things hum. Building work was in full swing, affairs at the Institute had improved, and greater efficiency had been achieved in every field of activity. He had made plans to go on his holiday after I came back. His full clean-shaven face bore the old signs of fatigue—that yellow tinge and pasty look, the pouches under the eyes, which, nevertheless, were as bright as ever. At the moment he looked a bit worried. He got up to meet me, and said jovially:

"Well, you know what Gogol says, 'Gentlemen, I have most unpleasant news for you.' What is it, Berezhkov?"

"On the contrary. It's very pleasant news."

I swiftly untied the string, spread the drawing on the director's desk and hastily improvised paper weights out of the massive ink-stand, an ash-tray, a stack of files, and a thick book to keep the corners down. Novitsky watched the proceedings in silence. Then, in a leisurely manner, he bent over the desk and asked, "What is this?"

"A thousand h.p. engine," I said.

I added nothing more. No engineer, still less such a capable one as Novitsky, who possessed, in the bargain, no mean gift of design thinking, could fail to grasp the significance of those three words—"thousand hp engine"—in the light of world engine competition.

Novitsky stood with both hands resting on the edge of the desk. For some reason I still remember those hands of his—the fingers had thick hair growing on their backs.

"I see," he said, still looking at the design. "Is that yours?"

"Yes."

Without a word he put the ink-stand, the ash-tray, the files and the book back into their places. The sheets of drawing paper rolled themselves up.

"I see," he repeated, and sat down again.

I noticed now that he was very angry. The bags under his eyes seemed to have swollen. But he kept his temper.

"Sit down," he said.

With a dawning uneasiness I dropped into the arm-chair as if I had been suddenly brought down to earth out of the clouds.

"We'll go into your private affairs later on, if you don't mind," Novitsky went on. "Just now please tell me what you've done in Leningrad."

"But, Comrade Novitsky, this is not a private affair."

"We shan't argue over that. How are our orders?"

I said nothing. Strictly speaking, I hadn't carried through a single commission. Novitsky, meanwhile, jabbed his questions at me, reciting off all the items of business I was to have attended to in Leningrad as though he were reading from a list. The list contained

the glisseur engine, and the equipment that was being delayed, and lots of other things.

"I see. Then which of the professors did you meet?" Novitsky asked. "Did you come to any arrangement with them?"

"I had some talks," I muttered.

He folded his arms on his chest. Obviously he was furious. I was expecting him to smash his fist down on the table at any moment. But he didn't. He got up, crossed over to the window, got out his cigarettes, lit one, and turned to me.

"Look here, Comrade Berezhkov. Either we're going to work together, or—" He strode up to the desk, ripped a sheet out of a writing-pad, and laid it in front of me. "Here's paper, write your resignation. We'd better part company."

"But, Comrade Novitsky, why? You haven't even looked at the drawings properly, you haven't heard me out."

"I'll look at them. I've promised you that. Excuse me for saying so, but you've shown utter irresponsibility. You have acted like an anarchist, at best like a school-boy."

"Comrade Novitsky!"

"Hear me out please. I'm not speaking to you as a good acquaintance but as your chief, a representative of the Soviet state. You are sent on official business, you undertake to carry out a definite commission, upon which depends the putting into operation of a very important enterprise—something for which we are held responsible by the government, and which has been written down here in black and white"—he did smack the desk after all with a volume bound in red leather—"and you go away and forget all about your duty—"

"Comrade Novitsky, my duty—"

"Don't interrupt me, please. You forget your obligations, and attend to private business of your own—some invention or other that suddenly comes into your head—which no one asked you to do."

"Comrade Novitsky, this—"

"This is sheer anarchism. Individualistic playing at genius. If you want to work with us, you must first of all learn to submit to state discipline, to plan and order. If you did a thing like this at the front, I'd have had you court-martialled. But here. You can write your resignation. You'll be free of all duties from today."

I was silent. I felt crushed, borne down by this domineering man with the heavy hand. He, too, was silent for a moment.

"I'll have to reprimand you officially," he said at last.

"Comrade Novitsky, I have only one excuse."

"And that is?"

"This thing!" I said, pointing to the sheets of drawing paper that still lay rolled up on his desk. "I haven't really wasted so much time. You still have time to send someone else to Leningrad today. I can't afford to lose a single day. You know how badly this engine is needed. I had a right to—"

"You had no right. You're arguing like an individualist again. You get something into your head and everything else goes to the devil! Excuse me, but that's not our principle."

His manner of uttering words like "our," "us," "we," put my back up again, the way it did when we first met. Again I felt like shouting out, "And who am I—am I not one of 'us'? Am I not 'we,' the state?" But caught off my balance as I was, I was scarcely conscious of this feeling.

Novitsky pressed a button, and his secretary came in.

"Take this down, please, then type it out and bring it for me to sign. 'A. N. Berezhkov, Head Designer of the Institute, has returned from his business trip to Leningrad without having discharged the commission imposed upon him. For this breach of duty he is herewith reprimanded.'"

"Comrade Novitsky," I broke in, "I understand that I am guilty of a breach of discipline."

He glanced at me swiftly, and the frown on his face suddenly gave place to a friendly smile.



"That admission is enough for me, Berezhkov. Let me have that, will you."

He took the unfinished sheet of notepaper from the secretary, tore it up and threw it into the basket.

As for me. Ah, well, old chap, if I'm to tell the story I might as well tell you everything. Deep down in my heart I felt that if I had had to make that trip all over again, I'd have done exactly what I did—I'd forget everything in the world and start drawing that engine.

17

Novitsky dismissed his secretary and asked her to have two glasses of tea sent in.

Then he turned to me.

"Well, let's have a look at your thousand h.p. engine, Berezhkov. Take a chair. Draw it up."

The conciliatory tone and the two glasses of tea, of course, were an olive branch. Novitsky spread the drawings out himself, and closely examined them one by one.

"I can't make out what construction you have based this on," he said at length. "It's something—"

"Something new!" I exclaimed. "You won't find a solution like it in any other engine in the world. A liner, and this indestructible bank, reinforced by the block-cast head, and these stay bolts, which stiffen up the whole thing, give it exceptional rigidity. This is not American, nor German, but something entirely new, our own. You said something about my getting a sudden idea into my head. That's where you are wrong, Comrade Novitsky. This is a logical sequel to years and years of quest. I've been thinking about rigidity for a very long time, and now I've got it at last! But the main thing is that this engine now has a production backing, it is based on the technology of the Volga plant. D'you know how the idea came to me?"

Novitsky sat smoking, sipping his hot tea, and glancing alternately at me and the drawings. I was sitting beside him, and felt as if I were floating on air. All my enthusiasm for the thing I had created came back to me. I

told him how I had seen the D-30 engine with the mark of the Volga plant on it, how I had stopped dead in front of it, how I had sat down to the drawing board and forgotten everything on earth except the engine that I saw outlined in my mind's eye—this thousand h p engine.

"Thousand h p      I'm. " Novitsky smiled. "Thousand horse-power bubble, Berezhkov "

I came tumbling down to earth for the second time that day

"A bubble? But why?"

He went over the thing. He was now talking to me as a fellow-worker, as engineer to engineer, and first of all voiced his doubts on several technical points. Wouldn't the bolts burst? How would the block-cast head behave? All this was rather risky and untried.

To do him justice, he put his finger right away on the very spots which I subsequently heard criticized so often that I got sick and tired of listening to it.

We argued for a long time. He wouldn't change his mind. My references to Ladoshnikov only irritated him.

"Since when is an aircraft designer the highest authority among engine men? Ladoshnikov can do as much fanciful thinking as he likes in his own department, but I am not going to have my Institute thrown into a fever again on account of this doubtful thing."

I started to protest once more, but Novitsky was not to be shaken in his opinion.

"From whatever side you look at it, your thing is doubtful, or at best premature," he said. "It will only mean more fuss and muddle for the Institute. And what's worse, we'll muddle up the factory too. D'you know what the position is there? They're just mastering the new technique and are not fulfilling the output programme. If we change the engine model at this time of day, it will only make things worse. We have another plan, Berezhkov. Our Soviet construction will grow naturally out of the D-30 by way of adaptation. We have adopted a definite strategy. And what you are doing virtually amounts to obstruction. I assure you we shall only be slackening the pace that way."

"But I want to speed it up."

"You have other ways of doing that. Organize your design groups better. Carry out your five-year plan in three years. I can understand that this upsets you, but from the point of view of the state interests—"

I flared up at that.

"You talk as if the state interests were your monopoly. Why? Because you are the director? Isn't it possible for a creative worker, a designer, to understand the state interests in his own field better than you do?"

With a look of calm amusement Novitsky picked up one of the bound volumes that lay on his desk—the five-year plan of the aircraft industry.

"This is a state document, isn't it?" he said.

I was silent. He continued.

"And one, which, if my memory does not fail me, you took a hand in drafting. Isn't that so?"

"Yes."

"But that thing of yours doesn't figure here. Are you going against your own signature?"

"Yes."

"That means going against the five-year plan?"

"Excuse me, Comrade Novitsky, but that's a formal argument."

He narrowed his eyes.

"Formal?"

"Yes."

Suddenly the game of snowballs at the Motorstroi building site came vividly back to me. Rodionov turning to Novitsky, had shouted "Down with the formalists!" Those words, uttered seemingly in jest, hadn't escaped him for nothing, then.

"Yes," I repeated firmly. "That book is no dogma. We may always supplement it with our deeds. In fact, it's our duty to do so."

"I see. I wish you success, then."

"There's no call for irony. This project didn't exist before. But we need it, everyone's waiting for it. That means that something has been added to the five-year plan since it came into being."

He smiled again ironically

"From that very moment?"

"Yes, from that very moment!"

"I've never seen a man to be carried away so easily, Berezhkov. It's an obsession with you!"

"Just as you like, but I'm going to insist on my project."

Novitsky frowned.

"Very well, then. We'll call a meeting of the Institute's designers and hear what they have to say about it."

18

Until the meeting, which was arranged for the next evening, I could speak and think of nothing but my engine. I wanted people to see it, I was keen to hear what they thought about it.

But would you believe it—all the designers of the Institute were against me almost to a man. What was the reason?

Considerations of a personal nature—things like envy, dislike, or ill-will towards me as Head Designer, whom they remembered as junior draughtsman, do not come into it.

All those years, beginning with the cylinder head for the AIS engine, I had done nothing but bring in dozens of drafts, lay-outs and drawings, and kept everyone at the Institute worked up to a pitch of excitement. And what was the result? Where were my great deeds, my creations?

So this sort of guarded attitude towards me would seem to be only natural. It was justified in the light of my entire career as a designer.

Later, after many failures, I quieted down, dropped into the rut, went about the daily routine of managing my department, submitted my design of the glisseur engine, redesigned the Hispano, and so on. My relations with my old rivals on the staff, the engineers of the older generation, whom, willingly or unwillingly, I had so

often given offence to in the old days, had gradually adjusted themselves. I was accepted, put up with. Then all of a sudden I exploded again. It was baffling, alarming. Naturally, my colleagues shied at my draft, were hyper-critical about it.

I rushed off that evening to see Ganshin, my nearest my oldest friend. He was living now in his new flat in the new apartment building of the Zhukovsky Aeronautical Academy. His large study was littered with books, periodicals and drawings. Ganshin was working on the second volume of his fundamental work entitled *The History and Theory of Aircraft Engines*. The first volume had brought him fame. The appearance of a bald patch on top of his head was good enough excuse for affecting the professorial black skull-cap, and this, together with his spectacles, his shabby house jacket and inky fingers made him a perfect model for the portrait of an inspired scholar. I promptly laid my drawings out on his desk over the littered pages of his masterpiece.

The great sceptic glanced at it and said blandly, "A whizprop?"

"Stop that, Ganshin. Tell me seriously what you think of it."

"Here goes, then, seriously."

And the famous author of the unrivalled research into the history and theory of aircraft engines fell upon my lay-out. A good friend is also a good critic. I defended myself like a lion, but I was grateful to him, because the thing grew clearer and clearer to me. It stood up to the acid test of Ganshin's deadly analysis and came through unscathed. Towards the end he wavered, and even went so far as to admit that I had grasped and expressed the most progressive trend in aircraft-engine development.

But he still had a multitude of doubts. I declared with impassioned faith.

"You wait, the last chapter of your book will be devoted to my engine."

"No," he said. "Several chapters of still unwritten history will have to come first."

Strictly speaking, this was the same point of view that Novitsky had already put forward, namely, that my engine was premature. Ganshin remonstrated with me in a friendly tone.

"Just look how many times you have failed. And you know perfectly well that two or three failures are enough to have a designer wiped off the books. No one will take him seriously any more. You're just lucky to have survived the fracas after the failure of the D-24. They've kept you on as Head Designer. Then why don't you leave well alone? You can't afford to take risks now. Don't you realize that one more failure will put an end to your career?"

But I didn't want to hear anything

"To hell with my career!"

"Call it destiny, then. The destiny of Alexei Berezhkov."

"To hell with destiny! I've got an engine! It'll cut the distance we have to go in order to catch up with engine building abroad by two or three years. I haven't come here to talk about myself. It's not a question of Berezhkov's destiny, but the destiny of the Soviet aircraft engine! And to some extent the destiny of our whole country!"

"You're a poet after all!" Ganshin said.

"Drop it. Look here, Ganshin, let's both try and imagine what Zhukovsky would have said about this thing. D'you mean to say he'd have had nothing but doubts, like you?"

Ganshin looked at the design again, but said nothing.

"I've got an engine!" I repeated. "And do you know, I really don't care at all now whether it's mine or someone else's. I'll fight for it all the same."

Ganshin took his glasses off and went up to me. I looked into his grey attentive eyes, from which all the mockery had gone.

"I'll help you all I can," he said with deep emotion.

He relieved the gravity—I should even say solemnity—of that moment by smiling.

"At the worst," he added, "you can fix up your headquarters here and we'll work together. It'll be like old

times again. You'll do the drawing, I'll do the calculating."

In a transport of joy I tore the professorial skull-cap off Ganshin's head and threw it at the wall. Then I gathered my friend up in my arms and kissed him.

19

The next day Novitsky held a small conference in his private office to which only seven or eight men were invited. I made my report. Then our senior calculators and senior designers got up one after another and tore the project to rags. The main target of their attacks was the absolutely new construction of the cylinder bank, which distinguishes the D-31 from all other existing engines to this day. No one believed in the cooling jacket, in the block-cast head, or the anchor bolts. They said that nothing of the kind had ever been heard of, that it was all half-cock experimentalism. They quoted the textbooks and Shelest's works, found fault with almost every detail, and declared that one or another part was sure to break. I got all I had been asking for, and more besides.

Novitsky calmly steered the proceedings. His analysis of the day before was wholly confirmed by this discussion. He himself did not speak this time. As for me, the more I listened to the various objections, the clearer did I see that my solution was the right one, that I had, at last, hit on the design of the world's most high-powered and high-performance engine. I said as much with utter conviction, and in face of all the opposition asked that the working out of my preliminary lay-out should be included in the plan of the design department. Novitsky was rather surprised at my persistence.

"I'll think it over and let you have my reply tomorrow," he said.

The next morning I went to see him. Novitsky said he had thought the matter over and decided that further work on the project was inadvisable. He spoke at once firmly and placatingly in an attempt to comfort me and cheer me up.

"We can't afford risky ventures in our business," he said. "Wait till we've built our institute—then you and I will tackle the problem of a high-powered engine in real earnest. Some of your ideas will come in useful yet. But just now your project will have to be set aside."

I attempted to argue, but Novitsky became official and broke off the conversation. Several days later he went away on his holiday. It was a long holiday—six weeks.

## 20

What happened next? You wouldn't believe me, but just then of all times, in fact the very first Sunday after the conference where the verdict went so inexorably against me—it's an amazing fact, I tell you, but on top of all my troubles I went and fell madly in love.

Just picture it. The executive staff of the Institute all come out against me. Novitsky passes sentence on my draft and bans it. What am I to do? I decide to shake off the hypnotic spell of the thing, to get it out of my system for at least a day so's to be able to look at it again with a fresh eye.

By the way, I had a little car of my own—an ADVI-T model. You remember those days—the first *pyatiletka* had only just started and the magnificent Gorky motor-car plant was only under construction and its first creations—the unforgettable *gaziks*—had not appeared yet—well, in those days you could sometimes see on Moscow's streets funny little white-painted baby cars. I'm sure you must have seen the head designer of the ADVI, then a stranger to you, sitting proudly behind the steering wheel of one of those cars. We designed and built a batch of them at the Institute's workshops, and called them ADVI-T. The mysterious "T" stood for *tarakhletka*.\*

Afterwards came a swarm of *gaziks*, followed by *embars*, which we thought awfully posh at the time, but we still rode about in our *adolsiki* to the wonder of the Muscovites.

\* *Tarakhletka*—a noisy thing, a "clatterer"—Tr



Well then, when I received that last and definite rebuff from Novitsky—which was on a Saturday, worse luck—I said to myself “begone dull care” and decided to go out for a motor ride early the next morning.

Sunday was a lovely sunny day. I gave my *tarakhtelka* her head, and revelled in a sense of exhilarating youth, strength and daring—in a word, I felt as if I were rushing along in the ship of Time. Only yesterday they had made shredded cabbage out of me at the meeting, and the next morning I was up and full of beans. Somewhere inside of me there was a tune singing “We’ll fight the storm and weather it.”

By the time I drove out on the Leningrad Highway I was singing the song at the top of my voice. Dwelling-houses and shops flashed past me. Presently I saw a familiar building, the one-time premises of the Compass. I eased up the car there, but apparently let myself go with the singing. I say apparently because it was just there, outside the Compass of all places, that I was pulled up by the whistle of a militiaman on point duty. I was told that singing at the wheel of a car was a breach of the traffic rules. I protested with all the vehemence peculiar to my nature. The result was that the militiaman demanded to see my papers—my driving license and so on. As it happened I had no certificate of identity on me. The militiaman invited me to go to the militia station with him. That meant good-bye to my Sunday outing! God knows how long it would take them to establish my identity. And besides, the whole thing would put a damper on my spirits for the rest of the day.

The crowd that had gathered round the car was definitely unsympathetic. Neither the *tarakhtelka* nor her luckless owner commanded respect. The name “Berezhkov” with the added title of “designer” impressed nobody. “Come along, citizen,” said the militiaman.

Ever since then I’m convinced that militiamen bring luck. A voice from the crowd said:

“I can vouch for Comrade Berezhkov.”

The voice made me jump. I leapt out of the car. A young woman had come up to the militiaman. Was it she

or not? Wisps of fair hair escaped from under her blue beret. She handed the militiaman some paper or other without looking in my direction (as I afterwards found out, it was her student's card) and began speaking to him in a low earnest voice.

Her eyes—I had to see her eyes at once! Were they brown or not? And I had to hear her voice again!

"Do you know me?" I asked loudly.

I don't remember what she said, but the voice was familiar and the eyes were brown.

Meantime the militiaman, somewhat mollified, condescended to waive the sterner formalities and merely imposed a fine, which I paid with the greatest pleasure.

"Pass along there, citizens," said the guardian of the law, and, touching his cap, went back to his post.

Just the two of us were left in the road—she and I.

"You did vouch for me after all, Valya, despite certain reminiscences. And you were right. Your intuition is marvellous."

Valentina laughed.

"Intuition has nothing to do with it. I simply heard about you," she said, and added archly, "I've heard a good deal. About the Aircraft Engine Institute, for one thing."

"Are you connected with aviation?"

"I'm studying it. I'm a student, you know," Valya explained. "Before I entered the Institute I was on Kom-somol work for quite a time."

I pulled the car door open and invited my rescuer to take a seat. Why talk there standing? After a moment's hesitation, she stepped in and settled herself in the back seat while I sat down at the wheel. A brilliant idea came to me, and I wanted to put it into execution without her noticing anything.

Some of the interior fittings of my car were fastened down with small bicycle nuts. When she wasn't looking, I unscrewed one of the nuts and held it out to her.

"See? I've kept it all these years."

Oddly enough, my wife-to-be did not look in the least surprised or touched. She took the "souvenir" with a peculiar smile.

Presently I got permission to switch on the motor and continue the ride. We passed through Petrovsky Park. All of a sudden a pink palm reached over the seat with two identical nuts lying in it.

"I've kept mine, too, all these years," Valya said wickedly.

I looked round. The right-hand door had a nut missing.

"You are very observant," I said courteously.

"Observant and truthful," my passenger answered.

I opened out the throttle and raced all the way to the famous Archangelskoye suburban palace without saying a word. I was afraid she'd refuse to continue the ride with me. But it turned out a marvellous ride. That ride and what followed it.

Anyway, my friend, it's no use trying to explain how love comes and why. It could make another book. Maybe we'll write it some day. It's funny the way things happen, though. Here was I absorbed in a big problem, fighting for my thing with thoughts of love furthest from my mind, and all of a sudden I go and fall madly in love. Would you believe it, in less than a month Valya and I got married.

21

Novitsky returned from his holidays. He found me in the drawing hall and smiled a greeting to me while still at a distance. He came up, looking fresh and genial, and wrung my hand, saying:

"Congratulations, Berezhkov."

"What on?"

"What d'you mean? News flies fast—the whole world knows that Berezhkov has married."

I nodded modestly.

"Congratulations," he repeated. "I'm sorry I was late for the wedding."

"It wasn't much of a wedding. Just an informal little affair, you know."

"Why's that?"

"Too busy, Comrade Novitsky. So much work to do. The five-year plan."

"That's what I like to hear. But I'm afraid"—his eyes twinkled—"you didn't get much done this last month."

"On the contrary, I've got through quite a lot of work."

"Splendid. We'll have a chat about business first thing in the morning." His brown eye took me in narrowly.

"So you've settled down, eh?"

I laughed. Settled down? Not me! But I answered stoutly:

"Yessir, I'm a respectable married man now!"

"I'm glad to hear it. Very glad for your sake. You have splendid prospects. Please give my best regards to your wife."

Novitsky then passed down the hall, stopping to inquire after the health and work of one or another designer. His loose duck suit concealed his corpulence, but his calm leisurely tread was none the less heavy. He stopped at Nedolya's desk.

"Good morning, Comrade Nedolya. How are you getting on. You've become quite expert at drawing, I see."

Nedolya got up when the director addressed him, and stood there looking red and embarrassed, confound him.

"Very nice drawing, that, Comrade Nedolya. What?"—for a second Novitsky paused and looked hard at the drawing—"What is it?"

Nedolya hesitated. I hurried down to my friend's rescue, but Fyodor didn't wait.

"It's for . . . er . . ." he stammered. Fyodor was absolutely incapable of telling a lie. "It's for the thousand h.p. engine," he blurted out.

"What?"

Novitsky did not realize, for the moment, that while he had been away on his holiday, I and several young designers, friends of mine whom I could trust, had been working all the time on the designs of my new high pow-

cred engine. When it sank in at last, he was hopping mad. There was a terrific row

Naturally, Novitsky immediately forgot about the "splendid prospects" facing me, and shouted at me furiously:

"These are cheap sneaky tricks! No self-respecting designer would ever do such a thing."

"Comrade Novitsky, please don't forget yourself."

"I don't want to listen to you. You seem to have forgotten that this is a state Soviet Institute, not a private little racket, the firm of Designing Engineer Berezhkov. I won't allow you to demoralize the staff here by trying to smuggle through your own rejected inventions. If you don't want to work here honestly, you'd better leave the Institute altogether. I'm not going to give you any more warnings."

After giving me quite a chunk of his mind, Novitsky left the hall. That same day I was reprimanded in an official order.

On the face of it, of course, Novitsky had a weighty argument against me—the minutes of the conference of the Institute's leading designers at which my project was rejected. What could I put up against it? Just then, nothing but my conviction. I realized only too well that after all my endless failures that didn't count for much. Now what, in your opinion, was I to do? Go and see Rodionov? Yes, that is exactly what I decided to do. But not just slap-bang, empty-handed, with rough pencil sketches. Until I had properly calculated and worked out design data that could be defended before any scientific council, I had no right to run risks. The thing at stake was too big and important for me to rush unarmed or insufficiently armed into a new affray.

But I should really say "we" instead of "I."

## 22

That's what Andrei Nikitin told me that day. He, too, had been working with us all this time. He had undertaken to do the calculations for the engine.

I was sitting in my office brooding over my grievances, when Nikitin came in. He looked at my gloomy face and smiled.

"We'll have to chalk one up in favour of Novitsky to-day, shan't we?" he said.

"How can you joke about it, Nikitin? I tell you, I believe in this thing so much, I'm so convinced that it's just the thing that is expected of us, that. I'll go on with the drawings even if they put a hundred bans on it. Say what you like but I've decided to go underground. If it comes to that, I'll do all the drawings myself."

Nikitin laughed and sat down. It was good to see his calm face with the dark mop of curly hair and the strong, heavy, determined jaw. That was when he said to me.

"I tell you what, Alexei Nikolayevich, let's drop the 'I' now. What about saying 'we'?"

I roused myself.

"We? I'm out!" I jumped up and held my hand out to him. "It's a bargain, Andrei!"

It was the first time I had addressed the Secretary of the Party organization so intimately. The "Andrei" was out before I knew it.

Nikitin wrung my hand.

"Now listen, Alexei," he said. "I take all the fighting on myself, you do the work!"

And so with the settling of the question of "I" and "we" another intimate link was imperceptibly forged in our relations.

"But where am I going to work? Who with?"

"Underground," Nikitin said, laughing.

"No, seriously."

"You'll work at home in the evenings and at night with our boys," he said, naming Nedolya and several other of my pupils, all young designers. "I'll be helping you too. Valentina won't throw us out, will she?"

"Of course not! She'll help us with the drawings herself."

"Fine. Here at the Institute you must be on your best behaviour. Carry out your duties faithfully. Leave Novits-

ky to me." He squared his immense shoulders with a smile. "I'll see that you are not interfered with. Your business is to get the drawing of the lay-out done as quickly as possible. Every hour is precious!"

We shook hands again on it, and from that day the designing of my engine was done at home

23

We gathered every evening—on Sundays at nine in the morning—at my flat, which had been turned into a drafting office. My wonderful wife was promoted by her hubby to the rank of junior draughtsman, and she sat up the nights with us over the drawing desk. And that, my friend, was the way we spent our honeymoon.

Nikitin usually came late—sometimes round about midnight—but he never missed a day. He threw himself joyously into the atmosphere of seething activity, got down to work at once.

The young enthusiasts suggested various solutions and worked out the details. Things were often enlivened with a joke. For instance, one evening someone came dashing in, yelling, "Here comes Novitsky! Out of the window, Fyodor!"

And I bet you that if we didn't live on the fourth floor Fyodor would have done it.

What made these boys, these young engineers who believed in me, spend all their evenings and all day on Sunday over my engine? Who paid them for it? No one—unless we consider Masha, who never tired of pouring out tea and sometimes real coffee at all hours of the night. My assistants even came with their own bread and sugar, because food was rationed in those days. None of us could have stood the strain unless he had felt in all his being that we were doing something the country was badly in need of.

The call of the times! Those were the wings that bore us up and on. Bore us all, even Ganshin, the notorious

sceptic, who often came to help us when we were in difficulties. In point of fact, he directed the work of Nikitin, who was struggling with the devilishly complicated calculations.

At last all the design data—all the drawings—four large and several small sheets—were finished. The thing, worked out in all its details, had now become crystal clear.

24

One morning in August I rang up Rodionov's secretary. He put me through to his chief.

"Good morning, Berezhkov. Well, well, any good news for me?"

"Comrade Rodionov," I said agitatedly, "can you receive me? I want to see you on very important business."

"I know. Come down."

"Comrade Rodionov, what do you know?"

He laughed.

"I've been expecting you for a long time. How's your thousand h.p. engine?" he said, then added in a changed business-like tone, "Come down and see me at ten this evening."

And so I found myself in Rodionov's office once more. Encouraged by his pet phrase "well, well," and by that peculiar glance in which I read both trust and a heightened interest towards me—a glance that invites confidence and frankness—I poured forth my excited story while he listened with close attention. I told him with perfect frankness how I had made up my mind never again to design high powered engines, and how, spurred on by life itself

"Well, well, what spur was that?"

A kindly, I should even say joyous, smile seemed to be playing over his features all the time. I told him about the imaginative stages of the engine's history, right up to the moment when I saw it as in a flash of lightning—the thing that had been ripening somewhere in the subconscious sphere.



"The subconscious, eh? Well, well "

I thought he smiled again

"People often argue with me about that, Comrade Rodionov. They say Marxism does not recognize the subconscious."

"Doesn't it? I was thinking that you yourself are as good a Marxist as anyone in these matters."

"Who, me? In these matters?"

"Yes, you are."

Do you think he was joking, or was he serious? To tell you the truth, I've brushed up on my reading lately and am inclined to think that it wasn't a joke at all. But I am straying from the subject. What I said to Rodionov about my engine was this:

"Comrade Rodionov," I said, "I believe in it as I believe in myself. It has many novel features that are not to be met with in any other engine. That's why it's so easy to criticize and even to reject altogether. But it's this very unconventionality of my engine that constitutes the essential feature of the design. That's the whole meaning of it. That's just what puts it in the front rank of world engineering. But no one believes me except a few friends. I know that my reputation as a designer will be ruined if I . . . But I can stake my head on this thing. Here's my head! If that engine is a failure you can chop it off."

"That head of yours will come in useful yet," Rodionov said. "But believing is not enough. . . Are you fully prepared for battle, Berezhkov?"

"I am."

"Then " Rodionov assumed a business-like tone, "then we'll call an extended meeting of the Engineering Committee the day after tomorrow. We'll discuss your project there."

The committee met in the same hall where, two years ago, in 1929, the conference was held to discuss the high-powered engine.

Now another conference had been called to discuss my thousand hp engine. The director and chief engineer of the Volga plant, summoned by Rodionov, arrived by plane that evening. Several designers had been invited from Leningrad. There were representatives of the Aviation Trust, and of Moscow motor plants, the managers of various designing organizations, well-known professors, and the leading staff of the Central Aircraft Engine Institute headed by Novitsky.

Our drawings were hung around the walls, and the specialists gathered there had a chance of examining them before the meeting opened. In one group stood Professor Shelest, gazing at the drawings with his hands folded behind his back. I walked past him, but he did not notice me. Or perhaps he didn't want to. But the next moment he looked round, and our eyes met. He answered my bow with a nod of recognition. He looked quite friendly. Or was that mere politeness, customary good breeding? He was as elegant as ever, but his hair had more white in it now than black. My old teacher. Should I go up and speak to him? But he had turned his back on me again and was studying the design. This was the first time I was going to take the floor here without his blessing and support, without the support of the Institute. I wonder what Shelest would say today? Would he speak at all?

Podralsky was sauntering about here too. The vicissitudes of life seemed to have left no mark upon him. He still held the post of chief of the New Engines Department at the Aviation Trust. Suave, amiable, as fresh as ever, he had even put on a little more weight. I saw him go up to Shelest. He said something, smacked his lips, then strolled off. I had nothing good to look forward to in that quarter, that was obvious.

Frankly, I was terribly nervous. I knew it was going to be a hard fight. Of my friends here I had Andrei Nikitin. Valya was at home. For company she had all the young engineers, who had helped me to create this project and were now waiting anxiously for my return. In the little rooms cluttered with drawing desks, Nikitin had

prepared for the occasion, too. He was to prove the calculations, and would no doubt put in an enthusiastic word. But what weight would it carry here? What research works and scientific theses did he have to his name? So far none except the calculations for this engine, which had been turned down by the heads of the Institute.

Someone pressed my elbow. Ah, Ganshin. He leaned over and whispered, "Keep your chin up!"

"I'm all right."

"You can rely on me."

"I know, old chap. Thanks."

Yes, Ganshin's voice here carried weight. But then everyone knew him to be an old friend of mine. Who else could I rely on, who?

Rodionov came into the hall, skirted the rows of chairs and sat down not at the platform table, but slightly apart, by the window, where he could better see the drawings.

The chairman rang the bell. Allowing another minute until everyone had settled into his seat, he opened the meeting. The usual phrases suitable to such occasions were uttered, but I heard nothing until my name was announced.

"Comrade Berezhkov, will you please report on your project."

Come on, Berezhkov, the fight has started! "We'll fight the storm and weather it."

Well, I began handing out my revolutionary ideas to that assembly of highly qualified experts. It might have seemed as if I was denying everything I had stood up for two years ago in this selfsame hall. I had then demanded that we should merely benefit by the experience of world engineering, and refine existing designs of proved merit. Afraid of my own predilection for "whizprolism" and my own wild imagination, I had put a curb upon myself, and now here I was speaking up in a full voice.

I showed that in this new lay-out, this new thousand-hp engine of mine, I was, for one thing, following Zhu-

kavsky, using his little known works on aircraft engines as a groundwork, secondly that I was continuing the same line in engine rigidity which I had stood for previously, but was following it in my own way without regard for any foreign models. No more imitative engineering—we had passed through that stage, with all its pangs, torments and failures! We were not going to repeat the structural forms that had already been created and developed abroad, we were going to blaze new trails of our own and take the world's lead! Two years ago we had no up to date industry for building aircraft engines, but we had one now. And my design thinking was based on that solid fact!

Never before had I made such an impassioned speech. I had a feeling as if—how shall I explain it?—as if it wasn't me making this speech, choosing my words, and building sentences, but my speech itself pouring out like a torrent that had burst its floodgates. I was all a tremble when I finished at last and sat down.

Then Nikitin took the floor. I thought, that, being Secretary of the Party organization, he would first deal with the political aspect of the problem from the Party point of view, but he went straight over to the blackboard, picked up the chalk and started to give the mathematical data of the engine without further ado. Too excited to follow the demonstration of proofs that I knew inside out, I merely watched the sturdy figure, saw the stubbornly protruding ears, the big swarthy hand that confidently wrote out the formulas on the board. And I listened carefully to the wary hush in the hall.

Afterwards, or rather that same evening, when Nikitin and I returned home, where we were awaited with burning impatience, Nikitin laughingly said that I, the non-Party designer, had spoken as an ardent Bolshevik, whereas he, the Party worker, had come out as a dry-as-dust calculator, a narrow specialist, who knew nothing else in the world except his mathematics. And we had hugged each other and kissed.

But I'm digressing again. Let us go back to that meeting.

The debate was opened. Production workers, factory men took the floor. They said that the castings had not been properly calculated, the weight was wrong, the design data was wrong, and allowance had not been made for this, that and the other, and therefore the engine would not give the performance that had been claimed for it. Above all, the anchor-block-cast system would break down through structural failure, it would never stand the strain, and therefore the whole thing was a sheer waste of time. The shorthand report of that meeting would make interesting reading today. I'd dig it out from the archives if I were you.

Podraisky spoke on behalf of the Aviation Trust. He still retained his old habit of speaking with slow smooth relish. He started off on a reminiscent note.

"I knew Comrade Bereshtkov when he was still a young man," he apprized the assembly, and then proceeded to mention the Adros.

"Who could then believe in this design by a graduate-inventor based on an entirely new principle?"

After that rhetorical question, Pussycat made a movement that faintly resembled a bow. It could be interpreted as meaning: "Modesty forbids my talking about my own part in this matter."

"It was thanks to the assistance of Professor Zhukovsky that we succeeded in building that engine," he purred on.

We succeeded. H'm. It sounded as if he was going to offer me to go fifty-fifty with him again. I shouldn't be surprised.

"I am inclined now, as I was fifteen years ago, to support Bereshtkov's new design," Podraisky continued.

For sheer dogged tenacity of life our Pussycat, I would remark in passing, remained true to type, and I wasn't at all surprised when I eventually heard him also taking to himself the credit for supporting my new engine.

He took care in his speech not to quarrel with the production men, towards whom he showed sympathetic understanding. Admitting that it would be difficult for the

manufacturing industry to handle such an engine at the moment, he moved first, that the engine should by all means be built, and secondly that production on it should be started within a year or eighteen months when the aircraft engine building industry would be stronger on its feet.

Eighteen months. Not a bad idea, that, considering that losing time in creating an aircraft engine meant losing everything.

Then the theorists came out, among them, of course, Nieland, who had an old grudge against me. Did he sneer and scoff at my project! As for Nikitin, Nieland did his best to annihilate him. He put rhetorical questions to him in the tone of a school examiner and ended up by declaring that he wouldn't give him more than four out of ten for his calculation.

But do you know what I was thinking of while he was speaking? You know that ever since our first meeting and that memorable nut-bolt incident we had always been at loggerheads with him. But this constant fault-finding of his, this extreme pedantry only helped to discipline me and keep me up to the mark. Some particle—and, maybe, no mean part either—of our drawings that hung in that hall, belonged to him, my ill-wisher Nieland. And he never suspected it for a moment.

And then Novitsky got up to speak. I saw his coolly assured ironical smile. He was already exulting.

"Comrades," he began, "strictly speaking, everything that needed saying has already been said here. It relieves me of the necessity of explaining why this project was not accepted by the management of the Institute."

In the same quiet mocking voice, he annihilated my project so thoroughly that all further dispute seemed to be useless. His speech, I must say, made an impression. He summed up all the criticism, gathering it into a ram, as it were, and used that ram with deadly effect. I had a glimpse of Ganshin's anxious face.

It was a bad quarter of an hour for us, I must say, and things looked pretty black.

Imagine the state I was in—the eagerness, impatience, hope—when I heard the chairman say, “Professor Shelest has the floor.” He said it in a respectful tone. Although he had been removed from administrative office, Professor Shelest was now a member of the Engineering Council under the People’s Commissar of Heavy Industry, and to all who were present in that hall he remained an eminent scientist, the founder of the Russian school of engine building. I remember his speech word for word.

“I have been called upon during my lifetime to express my opinion on numerous projects,” he began. “Hundreds of drawings have passed through my hands. Among them were all kinds of foreign designs, students’ diploma works, and all the projects that have been discussed here at the meetings of the Engineering Committee. Among them were my own works, or works that had been drafted under my guidance. But this is the first and only time in my life that I have no critical remarks whatever to make. There is not a single detail I can find any fault with. In duty bound I must say that this is the most talented piece of work I have ever come across.”

Yes, my friend, those were his exact words. Shivers ran up my spine as I listened to him. “The most talented piece of work!” My God, could I be dreaming?

Shelest went on to tick off the chief qualities of the engine—the rigidity, expressed with absolute consistency, as he put it, throughout the lay-out, the stiffening effect of the hold-down bolts, which, he asserted, would not break, the special type of valves, which made for better engine performance, and so on and so forth. He said the engine had to be put into production immediately without losing a single day.

“Unfortunately,” he said, “some comrades do not realize how talented this design is.”

That was more than Novitsky could stand. He interrupted the speaker with an ironical, “You’ll be calling it a work of genius next!”

Shelest paused, glanced at the drawings, and answered

'No A genius hits a target which he alone can see. In this particular case we can all see the target clearly And our comrade has hit the bull's eye. I congratulate him and all those who assisted him. I am proud to have been one of his teachers "

I wanted to rush up to him, but I sat there rooted to the spot, unable to stir a limb I was stunned with joy I could scarcely breathe.

Novitsky interrupted the speaker again in his usual overbearing manner But he overlooked the fact that the old man was likely to be a dangerous opponent when provoked Shelest paused and his swarthy face hardened. His attitude towards Novitsky, who had replaced him as head of the ADVI, had always been one of studied politeness. Even now he undoubtedly had to make an effort to overcome certain deeply ingrained scruples. But he overcame them. Breaking off the thread of his thoughts, he said drily-

"Do you want me to explain your mistakes to you, Comrade Novitsky? I can do so if you wish. For one thing, you do not appreciate the latent possibilities of a real talent, and for another, you do not realize that there exists such a thing as precipitated rate of development."

"Is that so?" Novitsky shouted out ironically "And you have always realized it, I suppose?"

"I have made serious mistakes in my time," Shelest said slowly and distinctly "But I recognized them, whereas you still haven't recognized yours. That's the difference between us And now, will you please let me resume?"

Novitsky was forced to swallow that pill. Nikitin nudged me and whispered, "Good old Shelest! Who'd have thought it!"

In fact, I was surprised myself But you have to bear in mind that Shelest had been working for some months in close contact with a man like Sergo Orjonikidze—the People's Commissar of Heavy Industry, under whom the sixty-year-old learned professor had received his second schooling in life and was richer for the experience. As for Novitsky—it became perfectly clear to me



that this prominent organizer of big building projects, this strong, masterful, efficient man would be trampled down by our movement unless he quickly and thoroughly got rid of his prejudices and misconceptions, which, previously not so glaring, were now dragging him backwards. But of Novitsky there will be more anon.

The next one to speak was Ganshin. Shelest's speech had put new life into him. He, too, gave the project a brilliant testimonial and firmly declared that the thing was so interesting and promising that it would simply be a crime not to build that engine, not to put this theoretical dispute to the test of practice. And it had to be built quickly if it was to be built at all.

Thanks, old chap! That's all I want. Just this—to build the engine, and build it quickly.

At the close of the debate I made some concluding remarks in answer to my opponents. Rodionov said nothing at the meeting, but he sat there till the end, listening to all that was said. No decision was announced.

## 27

After the meeting—I don't know why—I went up to Rodionov who had left his place by the window. I had no intention of saying anything to him. I suppose I merely wanted to meet that encouraging look of his again, to hear him say something before I went away. Several men were standing round him.

Kushchin, the massively built director of the Volga works, who looked like a heavyweight wrestler, was arguing heatedly with him. The moment I drew near I realized that they were discussing my engine.

"Comrade Rodionov," the heavyweight director was pleading, "I don't care where you send the thing. I've got nothing against its being built, if it's got to be. But for God's sake don't throw it on to our shoulders."

"You're worrying before your time," said Rodionov. "Nothing has been decided yet."

"Oh, no, this is just the time. Can't I see the way things are shaping? Bear in mind, Comrade Rodionov, you'll be retarding production schedules at the works. The whole of our heavy aviation will not get its engines on time if we—"

Rodionov's neck suddenly reddened.

"That'll do!" he cut him short. "Words like that don't become a Communist, a Soviet director."

But Kushchln was not in the least put out.

"I'm not in love with my director's chair, Comrade Rodionov. It's not myself I'm worrying about, it's the works."

"What a thing to boast about!" Rodionov said ironically. "Who thinks of himself in such matters?"

At this point Novitsky spoke up. He had been standing slightly apart, saying nothing.

"You don't have to go so very far for an example, Comrade Rodionov," he said in that not too loud but weighty voice of his, and I caught a hint of malice in his tone. "As it happens, Comrade Berezhkov thinks more about himself than anything else. What does he care if a factory, or two factories, are disorganized, if the planes that are waiting to be powered are not put into service on time! Everything may go to the devil for all he cares, as long as he, Berezhkov, can have his engine built!" He then turned to me and added sarcastically, "You're just dying to make a splash, now, aren't you? Make the name of Alexei Berezhkov famous?"

Rodionov was about to answer him, but I did not give him the chance. All my fighting instincts were thoroughly roused. With a foretaste of the crushing defeat I was going to deal my opponent, I shouted out excitedly:

"That isn't true! It's a monstrous lie! To disprove it once for all, I declare that never anywhere am I going to call this engine the creation of Alexei Berezhkov. It's a collective creation! If we have to give our engine any name, we'll call it SHP-1—Soviet High-Powered First!"

Rodionov laughed.

"Aren't you rather in a hurry with the christening?"

Cooking the hare before catching him? Well, well, home you go—all of you!"

I went home together with Andrei Nikitin. Our friends were waiting for us there and we celebrated in high style. Valentina and Masha provided the refreshments, and if the wine did not exactly flow—Valentina, whom I sometimes still called the "prim maid," was very strict in that respect, no matter what the occasion—I was drunk enough as it was with elation. After a while the company started protesting. Enough of Novitsky! Enough of the problem of individualism! But I couldn't stop myself, and even drew on Mayakovsky.

"A hundred and fifty millions is the name of the author of this poem!" I recited ecstatically, pointing to the rolled up engine designs.

My gentle little sister came up to me and whispered in my ear, "Don't talk nonsense!"

I was dumbfounded. The next moment, however, I recovered my wits, and would have retaliated with something crushing, but a family scene was obviated by the ringing of the telephone in the hall. At last our trunk call to Leningrad had been put through, and Ladoshnikov was on the line. But I was kept away from the telephone. All Mikhail's questions were answered by Nikitin. I submitted, reconciled by the thought that Ladoshnikov, knowing certain tendencies of mine, would not have believed the story of that day's momentous events if he heard it from my mouth.

28

We were in an agony of suspense for several more days. And then I was summoned to the Engineering Committee where I was told that it had been decided that my engine was to be rushed into production at top speed. It was numbered D-31.

Novitsky must have got it hot, because he was as affable and friendly as if nothing had ever happened between us. Practically unlimited funds were placed at my

disposal for pushing the project to completion. The design was split up into structural elements, each to be executed by a group in charge of an engineer appointed by me; the groups competed among themselves, and I paid out bonuses, piece-work, and so on. To make a long story short, we prepared all the working drawings for factory use in an incredibly short time—a month and a half.

And would you believe it, again there was a hitch. Although the engine was scheduled for production, the aircraft industry flatly refused to handle it. Dozens of conferences were held on the question, and everywhere the representatives of the aircraft industry jibbed at it, and kept singing the same old tune about the factories being overloaded with quantity production engines, about output plans not being fulfilled, about the new plants still floundering in a sea of constant breakdowns and about it being impossible under such conditions to handle yet another engine.

Just at that time Rodionov was appointed Chief of the State Administration of the Aircraft Industry. He had long taken a close interest in engineering and industry. As Chief of the Soviet Air Force, he had never, as you know, limited himself to the execution of his own direct duties. He not only knew his air squadrons, manoeuvres, training, and flying personnel, but also drew into his orbit, as it were, various research institutes, and he always kept in touch with designers and engineers, constantly visited the factories, showed a lively interest in things, directed them, pushed them on. Therefore his appointment to a production job was something we all understood.

I was invited to one more conference at the People's Commissariat of Heavy Industry. There I first saw Rodionov in civvies. His erect soldierly carriage had always been associated in my mind with army uniform, but he was now wearing a new grey suit. He struck me again as looking surprisingly trim and clean-built. Although he now wore a felt hat, the pale mark left on his sunburnt forehead by his military cap still remained. The representatives of the factories and the SAAI engineers

at the conference spoke again about the tremendous difficulties the factories were experiencing in mastering the new techniques, and about how the handling of the new engine at such a moment would make a still bigger hole in the production plan. The director of the Volga works refused once more to accept our order.

Rodionov listened, asked questions, tried persuasion. Then, reddening, he stood up and struck the table with his fist.

"Enough! I am not going to explain a hundred times to you what this engine means to the country. I order you to start construction of that engine from tomorrow!"

All were silenced. Here was a man, everyone felt, who was not to be trifled with. Rodionov sat down again and turned to me, saying:

"Comrade Berezhkov, go out to the works tomorrow with the designs and start construction. Take a team of engineers with you. If you come up against any resistance at the works, wire me immediately. Give me the names of all who try to hinder you."

The next day I left for the Volga accompanied by Andrei Nikitin, Fyodor Nedolya, my wife, and two or three other assistants.

The factory, as I said, was seriously behind-hand in the delivery of the D-30 engines. It was terribly undermanned as regards skilled workers. And there was nowhere you could get them from. Considering the rate of industrial development that was not to be wondered at in such a pre-eminent peasant country. It was only the Bolsheviks' steady faith in the newly released powers of the people—powers that were called to life by the Revolution—it was only this infinite revolutionary faith that made them undertake what was, from the ordinary engineering point of view, such a seemingly mad venture as taking thousands of people straight from the village, off the land, bringing them to the building site, putting

them up in temporary wooden barracks, and then, when the factory was built, putting them, yesterday's ploughmen, to operate the most delicate of automatic machines and giving into their hands the most refined and perfected precision tools of such an industry as that of aircraft-engine building. People with rough untrained hands filled the vast shops of the Volga works, which had only just been equipped with all kinds of up-to-date machinery, automatic lines, etc.

And those people, who had never seen an erection drawing in their lives and had been trained to learn by doing, displayed the same will and grit, which they had shown during the days of the Civil War, when they and their fathers had fought for the Soviets on all the numerous wide-flung fronts.

And, just imagine, after starting with one hundred per cent spoilages, and coming down gradually to ninety, eighty, seventy-five, these sellsame people after a while began to fulfil the production programme brilliantly, and are now turning out the finest engines of new Soviet designs.

Well then, at the time our team arrived on the Volga, the works was engaged in building up its cadres. The slogan "Cadres decide everything" could be met with not only on placards, but on the sides of motor lorries and on the walls of the factory buildings. The second stage of construction was under way, and the site was still a jumble of wet clayey earth and debris. In the shops breakdowns of the machinery, accidents big and small, were a daily occurrence, thousands of spoiled parts were carried out in wheelbarrows, all kinds of proficiency classes and training circles for young workers were functioning, leaflets were published—in a word, a hard fight was going on for mastering techniques at the works.

Therefore, when we barged in with our drawings and blueprints, we did not even raise a ripple either of wonder or excitement.

I wouldn't say that we met with any resistance there. We understood that the factory people simply had no time for us. We had to organize everything we needed

for the production of our engine parts ourselves, beginning from the planning office. We wrote out the work cards, and sat in the drawing office, altering the designs to meet the works' standards. We penetrated into every nook and cranny, and did all the routine work from the functions of junior clerk to those of chief engineer. We even usurped some of the directorial powers by suspending serial production of certain parts and slipping our own in instead. We were to the factory that harmful fungus, or, say, wood-borer, that gets into log-bull walls and destroys them by eating its way through them. And that's just what we were—one of those wood-boring worms that get where they want by gnawing their way through. We built our engine at the cost of disorganizing the works' planned serial production, and got what we wanted by wheedling, and cunning, and sometimes by kicking up rows, and often by getting round the foremen so that in the heat treatment or machine shops, say, our parts could be made before those of the D-30 engine.

I first came there with five of my friends, but later ten more arrived, then another twenty, then forty, and in the end our team numbered seventy workers. Of these eight were design-engineers, and all the rest were students of the Moscow Aeronautical Institute, probationers, inexperienced youngsters who did not understand a thing about production. Frankly, my hair stood up on end when they sent me all those greenhorns. I demanded production men, engineers or foremen, and they sent me students. What was I going to do with them? But the sending of these young people pursued a definite purpose.

It's impossible to describe all this in detail—it would make a book in itself. The best I can do is to dash off a scene here and there as it rises in my memory.

A small room in town. It's an old town—once a quiet little old-world place. And right next to it a factory springs up with fine big buildings. And over that quiet little town there now hangs the ceaseless roar of engines.

A fanatic like me should not have been allowed to head an alien team at a factory. Rumours reached Moscow that I was bulldozing my way through the works, destroying everything in my path. Comrade K was sent down to attach himself to me in the capacity of commissar, as if I were Chapayev, the hero of the Civil War who was commissared by Furmanov. We got along all right at first, and then we started to quarrel. I didn't want to consider anything, and really resembled an armour-piercing shell. It seemed to me that this man, who had been sent down to assist me, was holding up the construction of our D-31.

I sent Rodionov wire after wire "Remove K immediately, interfering my work." And K. wrote "Remove Bereznikov, otherwise we'll have neither engine nor works."

Throw-outs all the time. Hundreds of components had to be turned out to get a dozen good ones. The factory was working in three shifts. Parts were turned day and night, and only a tenth of them were any good. We, too, had to make as many as forty parts to get four good ones.

That dainty absolutely original block-cast head of mine was proving a tough problem. We had it cast twenty times, but all were spoilages. At last we got a good one. Then it had to be drilled.

Everyone says, "You can't drill it, the metal will break down," but I demand it should be done.

"Drill it! The drawing says there's a hole here and I want that hole drilled."

"I'm not going to. It's our last casting."

"Drill it. I'll answer to the government for it."

"No! You've got to consider the opinion of experienced men."

"Drill it! If it breaks I'll. I'll retire into the background and let you run the show!"



And amidst a deadly silence the workman drills the hole. Some fifteen people stand round watching. I was confident of our drawing. And sure enough the hole was safely drilled and blown through. The aluminium did not break down.

"There, you see! I've a good mind to wire Rodionov that you wouldn't let me drill the hole."

For the assembling of the engine I insisted on having two engineers from Moscow, both top notch experimenters, the best assemblers I knew. They wouldn't let me have them. After a great deal of trouble, though, I managed to get them sent down. At first they just hated the sight of me. So would you if you were dragged out of snug quarters in Moscow to this God-forsaken muddy hole and bitter cold, and crowded into a barrack hostel which didn't have water laid on yet and lacked the so-called "conveniences." But, mind you, a year later those men were as proud as anything because the first powerful Soviet engine had come out of their hands.

Rodionov listened very patiently to all my fits of hysteria—that is the only word by which I can describe my condition on those occasions when I was obliged to turn to him for assistance. His secretary, whenever she saw me, would say:

"Ah, Comrade Berezhkov? You've arrived from the works? I'll go and tell Comrade Rodionov you want to see him."

Rodionov took the scandalous goings on I told him about quite coolly. He would pat me on the back in a very friendly manner and do his best to cheer me up, saying that he would have this or that man called out and issue all the necessary instructions.

"And you go back to work, Berezhkov, and don't bother your head," he would say.

I would usually go back to the Volga the same night, and he would see to it that everything that had to be done was done.

We started to rig up one of the blocks. My I mean, our construction, as you know, was unconventional. We didn't know whether it would adjust or not, whether the head and the cylinder would make a close fit, whether the gas would not escape, whether the packing ring aluminum would work, and so on and so forth. In short, all these things had to be verified during the assembling and the testing—the first testing of the first block.

You can imagine what an exciting moment it was when we started assembling the dressed tangible metal from designs which, not so long ago, had been nothing but a fantasy. Would these metal parts—all this aluminum, brass and steel—laid out neatly within reach, become a working mechanism, the block of an engine, of the first powerful Soviet aircraft engine? Would it run, would it start roaring? That was all you thought of, all you waited for eagerly.

That day, the day of the first test, another important event took place.

First of all, try and picture to yourself the setting of the scene. Imagine that hour of night that precedes the dawn, the nearly half-mile-long erecting shop, practically deserted, because the night shift has gone and the morning shift would not be coming in for some time. The lines of big gleaming electric lamps run out into the hazy distance. The shop is so vast and high that the lights barely penetrate some places, and sometimes, glancing down the line of lamps, you suddenly feel as if you are standing on the deck of an ocean liner cleaving her way through a nocturnal sea.

Several lathes are revolving with a soft swish, electric motors are humming. Adjusters, maintenance mechanics and electricians are working almost noiselessly, preparing the shop for the next shift. The electro-automatic system is being checked. Somewhere high overhead, on an invisible panel, signal lights—yellow, violet, green—flash on and off as if on a ship's mast. And again you have that feeling of being rushed through space.

It was at such an hour one spring night that we assembled our block in order to test it on the quiet without witnesses, without reporters, or representatives from the centre, who were constantly descending on the works. Our team had been given a special section of the shop to work in. Our section superintendent was Andrei Nikitin. We had everything cleaned up, dressed, and shining for the assembling, marking-off plates glistened dully. The two engineers from Moscow—as I already told you, they were the country's top-notch assemblers, two of the most efficient men you can imagine—put on white gowns for the job. It was the only kind of overalls they used when handling aircraft engines. Similar gowns were issued to several other members of our team that night, including Nedolya. Nikitin had organized all the preliminaries, and had even found time to shave and change before coming to the shop. He turned up in his Sunday best and took no gown for himself. Grave, concentrated, pale with suppressed excitement, he went about directing things without any fuss, walking backwards and forwards between our plates and the lathes, where various parts were being touched up for fitting.

There was nothing for me to do but watch the proceedings. But can you imagine me sitting idle? I climbed up on to a metal platform and hung down from there over the engine, helping my comrades by putting the bolts into the holes—my hold-down bolts—and fitting the nuts on. The apertures matched splendidly, and the bolts fitted in one after another.

Having decided to make the test before the morning shift came on, we worked that night with smooth well-coordinated efficiency, and understood each other at a word, and sometimes without words. The necessary parts and tools were handed up and passed around in utter silence. I saw nothing around me but this mechanism that was coming into being under our hands as if by magic. And I worked and worked. Still seeing nothing but the engine, I held my hand out for another bolt, but no one passed it up.

"What's the matter? Give me a bolt!" I shouted

No one answered me. I looked around. A little way off I saw, standing in our section, a tall rather corpulent man in a long unbuttoned greatcoat.

I didn't mind him standing there. The trouble was that nearly all our assembly men were standing round him. And those two pedantic assembly experts, too, in their white overalls. Hang it, they had all dropped their work! Nedolya and Valya, too—what do you think of that! There was another chap there, standing next to the man in the greatcoat—a reporter of the *Za Industrializatsiyu* (*For Industrialization*), I believe he was, and a darned nuisance, let me tell you. He had been at me for some time. Fancy choosing this of all times for his interviewing!

"Hi, there, you in the greatcoat!" I shouted "This is the limit, really! If you have to be here, you might at least keep out of the way and let people get on with their work!"

Hailed in this civil manner, the man in the greatcoat looked up. Can you imagine—it was that familiar face we all know from the portraits—a thick, slightly drooping moustache tinged with grey, an aquiline nose, black eyes like ripe cherries. Once, on a never-to-be forgotten day in 1919, I had seen that moustache—it was then still black and had stiff curled-up ends—and those eyes, the eyes of the member of the Revolutionary Military Council of the Fourteenth Army. The man who stood there in the erecting shop was the People's Commissar for Heavy Industry—Orjonikidze, Comrado Sergo, as everyone called him.

31

I had barely recovered from the shock when I saw Nikitin, the supervisor of our section, making for the group gathered around Sergo at his usual leisurely shambling gait. Like myself only a moment ago, he had no idea of the identity of this man in the greatcoat, who had appeared in the erecting shop so late at night. It was all I could

do to keep from shouting out, "Andrej, can't you see who our guest is!" He drew near, then suddenly stopped dead in his tracks as he recognized the Commissar. Always a bit slow on the uptake, Nikitin stood dumbstruck for a moment.

The next minute, changing his gait and stepping out with military precision, he walked up to Orjonikidze.

"Comrade Commissar! In the section under my charge designer Berezhkov's team building high-powered Soviet aircraft engine D-31 is assembling the first block."

Sergo listened to his report and returned the salute. All those standing around him pulled themselves up military style. I'd like you to see that picture. Night. The lighted erecting shop. Vast and deserted. A deep hush. The Commissar and Andrej Nikitin facing each other. All the rest of the assemblers standing round in frozen attitudes like a group of soldiers. Valya, too, standing stiffly at attention, looking at Sergo with all her eyes. Nedolya in a white gown, looking very grave. Fair head uncovered.

Orjonikidze shook hands with Nikitin, breaking the spell Nikitin said

"May we go on with our work?"

Orjonikidze nodded.

"Stations!" Nikitin commanded.

## 22

I jumped down from the platform and went towards the Commissar with the intention of apologizing. He saw me and came forward to meet me with his hand outstretched, smiling.

"We haven't met for a long time," he said. "Must be about twelve years."

"Comrade Commissar, excuse me please," I muttered. "Forget my rudeness, I beg you."

"No, I shan't!" he said, a smile lurking in his moustache. "Never! If that's the way people meet me, then . . . then that means you have discipline and good order here. Eh?"

Unexpectedly, he took my arm and walked down the shop with me.

"Well, does it fit up?"

It was odd to hear him use our professional idiom. In reply, I couldn't help giving him the "thumbs up" sign.

"To a 'T,' Comrade Sergo," I said.

The "Comrade Sergo" came out quite naturally with me.

"Does the head fit close?"

Again he astonished me. How did he know the very things that worried me most? Strolling about with me, he asked me several more questions, which showed that he knew all about our engine and the people who were working on it down to the minutest details. Then he asked

"And what do those past masters say?" he then asked, pointing to the two engineers who had come down from Moscow, and responding to my smile with one that gave me to understand he knew all about the way I had wangled them out.

"Their spirits have risen today," I said. "They're not asking to go home any more."

"It doesn't matter if they do grumble a bit. Well, go on with your work, Comrade Berezhkov. When do you propose starting her up?"

"In about an hour and a half or two hours, I think."

"Good. I'll try and keep out of your way till then."

"Comrade Sergo, you're not in the way at all."

"That's all right. If you don't mind, though, I'd like to have a word with Comrade—what's his name?—the commander of your section."

Orjonikidze took off his cap, watched the assembling for a while, then beckoned to Nikitin and walked down the shop with him.

I learned afterwards that it was a customary practice of Orjonikidze's to come down to some works like this, without warning, and instead of first going to see the director in his private office, to go straight to the produc-

tion shops or the building site. He liked to slip his arm through that of some engineer, or foreman, or worker (the way he did with me) and stroll up and down for half an hour or so chatting and getting, if I may say so, first-hand information on everything he was interested in as People's Commissar of Heavy Industry. Middle-aged and corpulent though he was, he climbed to the topmost platforms of blast furnaces, went down into foundation pits, manholes and tunnels, and walked the length and breadth of the works, looking into every little corner regardless of distance, time of the day or night, or the weather. And everywhere he talked with people, talked and talked. He listened, questioned, and probed, trying to find things out for himself.

After talking with Nikitin, Sergo left the shop. We went on assembling the engine. At dawn, with the first glimmer of day brightening the windows and the skylight the last nut was screwed tight.

Now all that remained was to press down the starter. Naturally, I was dying to do that myself, and I had already gone up and looked round at my comrades, when suddenly I saw the face of Nedolya turned towards me.

And I said, "Will you all please step back! Attention! Nedolya, start her!"

Well, would she go or not? Would she give at least one pop? Or would she just remain dead? Scarcely had these thoughts flashed through my mind when suddenly the engine burst into a roar. She started building up at once with a peculiarly soft velvety sound. I had never heard anything more pleasant and melodious in my life.

We all stood stock-still, listening. A hand came gently to rest on my shoulder. With a start I saw Orjonikidze standing next to me. His greatcoat was damp—it was drizzling outside. He was holding his cap in his hand. Several raindrops clung to his black hair, which was still thick and curly. His forehead, too, was wet with rain.

"You're not going to drive me away now, I hope?" he said, leading over towards my ear.

"Comrade Sergo," I cried exultantly, "d'you hear that velvety sound!"

Sergo suddenly burst out laughing  
"Velvety? Why, she's roaring like a hundred devils!"  
"That's only one block, Comrade Sergo," Nikitin put  
in. "There'll be a thousand devils!"  
Sergo was still laughing  
"Velvety!" he repeated "That's a creator of engines  
for you!"

34

In those days Sergo was engrossed in the problem of production culture in the shop. He liked the way the machine-tools and other working places were kept in our section of the shop, and was interested in every little detail, right down to the design of the individual lockers which we had introduced. The word "interested," however, hardly fits in with Sergo's character. A much stronger expression is needed here. He took everything he did so much to heart that when he heard about these lockers he wanted to go and see them at once, but after glancing at me, he said

"How's your work going? Is there any way I can help you to get the engine made quicker?"

"We're running ourselves off our feet, Comrade Sergo. I need at least three or four more good technologists." I gave him a frank and detailed account of the state of affairs at the factory.

"We understand," I said, "what a hard time the works' personnel is having trying to master the new technics and fulfil the state plan, and we can hardly expect them to spare much attention for our experimental engine—"

"Can't you?" Orjonikidze interrupted doubtfully.

"Well, we do demand things, and even kick up a row sometimes, but they simply can't be bothered with us."

I mentioned my favourite comparison of our team to a wood-borer that ate its way through the tree, but I felt that Orjonikidze did not particularly like it. He said nothing, then suddenly asked, "How do you get on with Nikitin?"

"Splendidly! He's my mainstay."



"Will you call him," Sergo said, getting up "I'd like to take a walk with him through all those channels you have gnawed through here."

I thought he sounded annoyed. There was even a note of suppressed anger in his voice.

"Comrade Sergo, I didn't mean."

But his anger, obviously, was not directed against me. He did not let me finish the sentence.

"Creator of engines!" he said with a smile. "I don't think anyone else could have done the wood-boring."

35

At about ten o'clock in the evening Andrei Nikitin and I were called out to a conference in Orjonikidze's railway carriage. Kuschin the director was kind enough to send a car for us. Valya got into it together with me.

"I'll come part of the way with you," she said. "I'll wait at the station and have a walk until the conference is over."

The conference was likely to end late, but I did not argue the point. Valya had this in common with me, that she was impatient, and I knew it would be hard for her to sit at home all by herself at such an hour.

About ten minutes before the appointed time Andrei and I entered the Commissar's carriage. We were shown into a large comfortably furnished saloon. Orjonikidze was dressed in a linen jacket and linen trousers. A breeze fluttered the curtains on the open windows.

When we came in, Sergo was speaking on the telephone. He motioned to us to sit down, while he went on talking. It soon became apparent that he had Moscow on the line. He wanted to know whether the first blast furnace at the Kuznetsk Works had been blown in yet. The answers were apparently somewhat vague and did not satisfy him.

"Find out more definitely and ring me up," he said, and put the receiver down.

Then he turned to us and said with engaging frankness:

"I sometimes envy you engineers, I really do. What can be more thrilling than blowing in a new furnace or starting a new engine!"

"And what about making a revolution, Comrade Sergo," Andrei said, "Isn't that thrilling?"

I threw in:

"And isn't it thrilling to give the world a shake up and change it all?"

Sergo leaned towards me and raised his hand to his thick moustache as though he were going to whisper something into my ear, and said

"Between you and me, Comrade Berezhkov, I don't think I would exchange professions with you."

There was a knock at the door. Heavyweight Kushchin, director of the Volga works, came in freshly shaved and spruce in a new suit and shiny boots.

Several other men whom Orjonikidze had invited to the conference came in. The clock on the saloon wall began to strike ten. On the last stroke, to my astonishment, Novitsky appeared in the doorway in his invariable high-boots and military-looking tunic girdled with a broad belt.

"Novitsky," he introduced himself. "I have come at your request, Comrade Commissar."

"Ah, Lord Custodian of the State Plan," Orjonikidze said. "You're punctual."

"I flew over, Comrade Commissar."

"Lord Custodian of the State Plan," Orjonikidze repeated. "A plan bound in leather and gold. But talented busybodies upset people's plans and don't let you live in peace, drat them."

Obviously Orjonikidze was well aware of what had happened at the Institute.

Novitsky did not bat an eyelid. He stood at attention and said.

"Comrade Commissar, allow me here, in the presence of Comrade Berezhkov, to declare that I fully admit my mistake. There was a moment, or rather a period, when I did not appreciate the significance of the engine which he had invented. Now the whole Institute will buckle to

the task of creating the first high-powered Soviet engine in the shortest possible time."

"You speak like a book," Orjonikidze said.

"I mean it sincerely."

"Well, if a fault is openly confessed, one must put malice from one's heart. Make it up, comrades."

Novitsky turned to me.

"I was wrong, Berezhkov. Believe me, that isn't an easy thing to say."

I was touched.

"Comrade Novitsky," I said, "not a word more!"

He gave me his hand.

"From now on we're going to fight together for your engine," he said.

"Peace is restored, then," said Orjonikidze. He paused, then looked closely at Novitsky. "But won't there come a day, perhaps, when the repentant conservative will furiously defend this engine against its own restless designer? Won't that tiresome Berezhkov turn round one day and say, 'Comrade Novitsky this is no good any more, it's obsolete, it all wants changing'?" He turned his large black eyes upon me, and added, "I hope you'll be the first to say that when the time comes, Comrade Berezhkov."

After that he opened the conference.

"Let us put our heads together, comrades, and see if we can't get this engine out quicker. I can't tell you how badly we need it. The foreigners have sold us an aircraft engine, but they've got something better up their sleeve. If it comes to anything, they'll beat us hollow with that engine of theirs. And we don't want to be beaten. Judging by his deeds, though, Comrade Kuashchin would seem—"

"Comrade Sergo," Kuashchin pleaded, "it's not as if I am against it!"

"I'd like to see the crank who'd say outright he is at this time of day. No, these people sing a different tune now. It's—can't we go easier? Can't we postpone it? People who take this attitude are really opposing the Bolshevik tempo, and this amounts to lending support to the enemies of socialism, the enemies of our country, who figure on finding us weak at the critical hour."

This speech was made in a hard uncompromising tone. Then Orjonikidze turned to me, saying

"Will you please tell us what you need "

I mentioned all our requirements and wound up by asking for our team to be reinforced by several more efficient workers.

Novitsky supported me

"We'll give Comrade Berezhkov the men he needs from the Institute. We'll mobilize all our forces. May I ask you, Comrade Commissar, to let me come down here myself with another team from the Institute to help Comrade Berezhkov win victory in the shortest possible time."

"What do you think of that, Comrade Nikitin?" Orjonikidze asked.

Andrei answered briefly that he agreed with my proposal. After that Kushchin declared that he had no objection against my team being reinforced.

Orjonikidze's eyes narrowed, and I thought I caught a sly twinkle in them.

"Oh, so we're all of one mind! But I intend to do just the opposite, comrades. We'll have to cut Berezhkov's team down a bit and take somebody away from him "

"From me? That's impossible!"

"Only one man. I'm going to ask you for Comrade Nikitin. What's wrong in having him here for a bit as assistant director of the works? He'll be a help to Kushchin. What do you say, Kushchin? You think he'll take his own line? You may be sure he will! He won't treat a Soviet engine as if it were an unwanted foundling. He'll put a stop to the shocking state of affairs under which Berezhkov's team is obliged to get the parts for its engine made in a hole-and-corner way. What do you say, Kushchin? Have you any objection to such an assistant?"

"No "

"Then why so gloomy? 'No' That's not the way to speak about a thing that has such terrific importance for the Party, for the Soviet state. Now there is an engineer I saw at the Stalingrad Tractor Works, the manager of the machine shop. That man has amazing reserves of

energy. Nothing is impossible to him. You want this done? We'll do it! In such and such a time? We'll do it! Difficulties? We'll overcome them! And he does, he gets things done! We could do with more engineers and directors like him. Do you accept my offer, Comrade Nikitin? Will you take on the job? Will you put through our line?"

"Of course he will!" I burst out, unable to contain myself.

A smile flitted in the corners of Sergo's large mouth, and his eyes twinkled. The dimple in his chin suddenly deepened.

"I was afraid Comrade Berezhkov really wouldn't let me have a single man from his team," he said slyly. "But since the engine's designer gives us his blessing . . ."

He glanced at Nikitin.

"I'll take it on, Comrade Sergo," Nikitin said.

"You'll have your brother to compete with, you know. His engine is coming on, too."

"Did you see it?" I asked eagerly.

"Yes, I've been there. Just now you're half a head in the lead, but . . . if you're not careful, he'll beat you."

Sergo's thoughts went off at a tangent and he let the proceedings drift.

"I compare you two designers—Berezhkov and Pyotr Nikitin. What a difference! One is a flame, a flash, a man of sudden inspiration, the other methodicalness, work at steady pressure, foresight. What different talents! But for all their difference, both are Bolsheviks in engineering. And it is difficult to say which is the better."

Listening to him, I looked forward to the moment when I would repeat to Valya everything he had said. Talent. A Bolshevik in engineering. My face must have betrayed me—it might even have gone pink with pleasure—because Sergo saw to it that I did not get too high an opinion of myself.

"I must say, though, Comrade Berezhkov, that Pyotr Nikitin is better at handling men. He has made an excellent worker out of Lukin, for instance."

"Lukin?" I muttered lamely

The name conjured up the image of a mild, blond, stoutish man, the head designer of the ADVI, with whom I fell out from the very first day of my working with Shelest. The man irritated me—I thought him so maddeningly slow and apathetic. When I became head designer, I sometimes lost patience with him and took the drawings away from him and did them myself. And now. . . And now, in Pyotr Nikitin's team, he had proved himself to be a good worker, probably a splendid one. If Orjonikidze spoke so highly of him I'd have to tell Valya about that, too.

Meanwhile Orjonikidze was saying to Novitsky

"As you see, there'll be no need to reinforce Berzhkov's team."

"Nevertheless, Comrade Commissar, I believe I ought to take a personal part in the work here, on the spot."

"If you're so anxious to be doing something for Berzhkov's engine, I daresay we can find some other serious job for you."

Orjonikidze crowned my triumph by speaking about a plant that would probably have to be built for manufacturing the D-31.

"Would you like to build that plant?" he asked Novitsky

"I'd consider it as my bounden duty and an honour."

"Good. I'll remember that. I have a good memory."

The conference then went on with its business. Sergo discussed with us and settled several organizational and technical questions. Towards midnight Moscow rang him up. His open face with prominent features—the face of a man already close upon fifty—reflected the workings of his mind with a youthful spontaneity.

"That means I'll be on my way when they blow it in? Send me an urgent wire down the line. What? That's all right, I don't mind being woken up."

He laughed in response to some remark we could not hear and said

"I want to be woken up! It's no trifle—the first blast furnace in Kuznetski!"

He put the receiver down and said

"Do you remember all that gossip abroad about Magnitogorsk and Kuznetsk? They predicted that we'd only make ourselves look silly. And who's looking silly now?"

After the conference Orjonikidze threw his greatcoat over his shoulders and went out of the carriage with us.

A full moon was shining. The lodges of the railway guards, the cars on the side tracks, and the curb-stones at the crossings cast sharp shadows upon the ground. The lamps outside the station building lighted up the platform. There was a crowd there, waiting for the Moscow train, which was shortly due in.

But where was Valya? I looked up and down the sidings as we crossed them, and made towards the station. A crew was walking down a long train of freight-cars with lanterns, making a last minute check-up. I stopped. Next to one of the cars I saw a figure in a familiar light-coloured headscarf. What could Valya be doing here, I wondered.

She was bending down, watching the axle-oiler with such rapt attention that she did not notice me come up.

"Good evening, dear wife," I said at last.

Valya straightened up and beckoned to me.

"Just look how he works. I can't tear my eyes away."

The oiler had passed to the next axlebox. His lantern hung on his chest, leaving his hands free. Swiftly throwing back the lid with his hook, he extracted in a single deft movement the black oil-soaked tow that covered the axle journal, and dipped his glistening oil-can, which was evidently furnished with a special device, because he poured off the required amount of oil in the fraction of a second without spilling a drop on the gravel. He took no notice of us, and did not even glance at Sergo, who had come up with his greatcoat thrown over his shoulders and his bared head exposed to the fresh night breeze.

"Every movement is calculated and precise," Orjonikidze said.

"I've been watching him for some time, Comrade Sergo," said Valya.

The oiler looked round, showing a round pleasant face with a curly beard. Short and lean, he ran a quick eye over us. The light of his lantern played on Sergo's figure.

"May I go on, Comrade Commissar?" he said.

"You work splendidly, comrade. It's a pleasure to look," said Sergo.

"They wouldn't let me work like this before—said I was breaking the rules. But now they trust me."

"Breaking the rules, eh?" Sergo said with a note of interest. "What rules are they?"

"I'm sorry, Comrade Orjonikidze, I have no time to talk just now. Must finish this job."

"Go ahead, finish your job."

The oiler passed on to the next axle, Orjonikidze following in his wake and admiring the skill with which he worked. After a while he spoke to him again.

"Would you take a little ride with me? I'd like to have a talk with you. You can go back by the first train we meet."

"Will they let me go?" the oiler asked.

"We'll try breaking the rules," Orjonikidze said with a smile. "Perhaps they'll trust us enough to let you go."

Orjonikidze saw the station-master in his red uniform cap on the platform and went up to him with Valya and me following. The station-master drew himself up to attention.

"The Moscow-bound train is due in in twenty minutes, Comrade Commissar. We'll hitch your car to it."

"I know. That's not what I wanted to see you about. I want to ask you whether you can spare that axle-oiler for an hour or two to go with me. What's he like? How does he do his job?"

"He's a good worker. He handles trains fast," the station-master said, somewhat puzzled by the Commissar's request. "But hadn't he better get a wash first, Comrade Commissar, change his clothes? He'll make everything dirty in your car there."



"That's all right. He can wash in my car. He can change, too, if it comes to that—we'll find some clothes for him."

Sergo took leave of me and Valya, and, accompanied by the station-master, went back to the oller.

Valya and I took a little stroll around the station, then walked home down the footpath running alongside the embankment. Valya felt chilly in her jumper, and I covered her shoulders with one end of my jacket.

The Moscow train overtook us at the semaphore, whose green light was like a gleaming eye. The train had not gathered up speed yet and the lighted carriages sailed past slowly. There was the last one. I immediately recognized the curtain, which I had last seen fluttering in the breeze over the open window. Now the window was closed. Two shadows loomed faintly through the curtain. I could make out the profile of Sergo—he was leaning over towards his companion, whose face was fringed with a short curly beard.

The train rumbled past. We stood under the brushed open sky.

Valya looked in the direction in which the train had disappeared, her chin nestling against my shoulder.

"Sergo was the same with that oller as he was with you, wasn't he? Everywhere he looks for talented people who are upsetting the established notions."

"What a difference to Novitsky," I said.

"How dare you even compare them! I still don't trust that man!"

Covered with my jacket, we walked on under the glittering spring stars.

The building of the engine and its development took about another six months. At last, in the early winter of 1932, when the first snow had fallen, the engine was shipped to Moscow for the official test. It had already undergone factory tests where it had run continuously for seventy-five hours. This was the new increased official standard.

I'd like to describe one night to you, my friend—the last night of the D-31's official test.

I spent that night at home. Before that I hadn't slept for over two days and nights running. I just couldn't tear myself away from the block-testing stand and sat around or prowled about doing nothing, because the designer is not allowed to meddle with things during the official test.

The D-31 had already exceeded the old cherished target of fifty-hours' continuous performance testing. But there was a new limit now—seventy-five hours! My engine had another twenty-five hours to go. After fifty-nine hours' test running, Rodionov arrived. Seeing me well nigh deafened by the din, with a face that looked stunned and wooden through lack of sleep, he immediately had me bundled into a car and packed off home to get some sleep.

I remember, it was nine or ten o'clock in the evening. I was given a hot bath and a meal, and then put to bed, but I couldn't fall asleep. Valya sat by my bedside and we talked softly. The little ventilation window was open. Through all the noises of Moscow—the clang of the tramcars, the hooting and throbbing of motor cars, the sound of footsteps under the window, now quick young ones, now shuffling old ones, unintelligible snatches of conversation, sometimes an exclamation, laughter—through all these sounds I could distinguish the far-away note of my engine.

"D'you hear that, Valya? They're jazzing her."

She smiled.

"That's Masha fiddling about with the primus-stove. Go to sleep."

"No, it's not the primus. You just listen. It's humming like a silk thread."

She humoured me as one would a child.

"Yes, so it is. Now go to sleep."

I don't suppose anybody else would have been able to detect that sound through the clamour of the city—that finest thread of sound—I'm sorry, I can't think of any

other word for it. The engine had stood up to the forcing magnificently. Now they'd knocked off a hundred revs. She was running fine, splendidly. The string, which I alone could hear, was vibrating steadily in Moscow's air.

And then I fell asleep. It was a deep dreamless sleep, from which I suddenly awoke with a start. I jumped out of bed in the darkness. For a moment I couldn't understand what had happened. A vague feeling of disaster oppressed me. The ventilation window was still open. I could hear grating sounds outside, where the janitor was clearing the snow off the pavements with a scraper or a shovel. A tram rattled past. Aha, day was breaking already. Moscow was waking up. But what had happened? There was something wrong. Why did I have that ache at the heart? My God, the engine!

I rushed up to the window. Yesterday nothing, not even the hiss of the primus-stove, had prevented me from catching the distant sound of the engine, that only wave to which I was tuned with every fibre of my being, and now, at this quiet morning hour, my ear could no longer catch that note. It couldn't be! I strained my ears again. I put my head out of the little window. But I heard nothing. The thread of sound was torn. The engine was silent. It was. Where was my watch? It was the sixty-seventh hour of the test. That meant the engine was eight hours short.

I don't remember how I dressed, ran out of the house, caught a taxi—or maybe just a passing car—and rushed off to the works where the test was being made. All around lay fresh snow that had fallen overnight. It was a very calm windless morning. In the dim light of dawn one could see the smoke rising in pillars from the chimneys into the paling sky where two or three stars still lingered.

Windless. Well, I'll be damned! There had been a wind yesterday. And Valya had said—it suddenly came back to me with amazing clarity—she had said "Cover yourself up, the wind's blowing straight into the window." Yes, there had been a wind blowing in our direction. That meant.

I gave the chauffeur's knee a whack, and yelled, "Stop!"

He looked at me in surprise.

"Wait a minute," he said, "we're crossing the square."

"Stop!" I shouted.

He put the brakes on. I opened the door and jumped out. We were at Krasniye Vorota, which was several miles closer to the testing place than my ventilation window was. I stood out there right in the way of the traffic like a wooden post. There it was! I caught it again—that flimsiest thread of sound—in the calm morning air. The engine was alive, throbbing. I heard nothing else.

I was brought to my senses by a militiaman's whistle. He had come right up and was whistling almost in my ear. I started apologizing. I must have been wearing the silliest of happy smiles just then, because the militiaman shook his head and grinned too. He wanted to pilot me to the safety of the pavement, but I stepped over there myself.

The sustained, distant note of the engine rang in my ears—or rather in all my body, and echoed deep within my soul. I strode towards Lefortovo. That is the eastern part of Moscow. And all of a sudden, somewhere in Basmannaya, I saw straight in front of me the sun—a great flaming orb just rising above the skyline. Alone in the street at that early hour, I stretched my arms out towards it.

Six hours later the official test was over. The government commission approved the D-31. Our country at last had its own powerful aircraft engine, the most powerful engine in the world.

### 37

I want to tell you about another meeting I had with Orjonikidze. It was after the tragic death of Rodionov in that shocking air disaster.

It was the autumn of 1935. The working day at the Aircraft Engine Institute, where I was still Head De-

signer, was drawing to a close, when a sudden call came through from the secretariat of the People's Commissar of Heavy Industry Orjonikidze wished to see me urgently. While the car was rushing me down to Nogin Square, I looked through the window down which the rain was pouring, trying to guess what the Commissar wanted to see me about. Probably the D-31, I decided.

A vast new plant had been erected for the building of that engine. Novitsky had been put in charge of the construction work—or, as they say, had been switched over to a new job, and, to do him justice, had made such excellent use there of his organizing abilities that he was subsequently appointed director of the plant.

Well then, 1933 went by, then 1934, and 1935, the factory was working, producing the powerful Soviet aircraft engine of my design, while I seemed to have nothing to do with it all. I was never invited down or called in. At our institute, which had grown beyond recognition and now had an excellent experimental plant of its own, I still managed, among the general press of business, to find time for the D-31, which I occasionally investigated and studied—in the form in which it now came off the belt year by year.

Yes, the engine was being turned out, turned out exactly according to the sample we had once submitted for government test. At first I was glad, then anxious, then. But I will not describe what I felt about it. I'll give you the bare facts. The trouble was that practically no refinements were being carried out on the engine. She was not improving her power output. And engineering has ruthless laws. Today your engine may be the most advanced and powerful in the world, and in a year or two, if you have not been able to raise its performance, it will inevitably become out-of-date, be squeezed out by world competition. This handicapped the development of Ladoshnikov's new large high-speed aircraft, which was powered by our engine.

I examined the samples of the D-31 which we received at the Institute with growing alarm. They were all an

exact replica of the original D-31 on which, not so long ago, I had been working with such enthusiasm

Neither will I describe my attempts to interfere in the works' affairs, and the various proposals I sent down there. Novitsky coldly shouldered me off

"I'm responsible to the government," he said, "and not to you. You needn't worry about the works. It's none of your business."

"None of my business? But the engine's mine, isn't it?"

"Yours? Pardon me, but we have no private property in engines."

And so, as I said, the years passed without the works giving the country refined D-31 engines of improved performance.

What was to be done? I often thought of Rodionov—straight in everything—in word, and deed, and even in his appearance. You know what he meant to me.

The works that was producing the D-31 engines had been named after Rodionov, but I couldn't go to him any more.

My old friend Andrei Nikitin was far away—at the Volga works. He is still there. Sometimes I thought I ought to go direct to Orjonikidze.

And now he had sent for me himself

How it had come about I learned afterwards. It appears that Orjonikidze had called a conference of the leading workers of the Rodionov Works. I knew nothing about this conference. What happened in the Commissar's private office was this. Sergo put the question point-blank, "Why isn't the works giving improved performance engines? Why is the D-31 gradually becoming obsolete?" And he lent an attentive ear to the explanations, going into the minutest details, and trying, with his usual thoroughness, to get to the heart of the matter. Naturally, all kinds of explanations were forthcoming. The testing laboratories at the works were said to be inadequate, greater precision in the machining of important parts was

necessary, some of the shops needed re-tooling. Some blamed the construction itself, which they said did not lend itself to refinements and broke down at each attempt to increase the power output.

Sergo, as I was told, asked at this point.

"By the way, where is the designer?"

The works' director—our old friend Novitsky—answered that the engine was the result of joint effort, that the real designer of it was the collective body—the one-time staff of the ADVI and now the design office at the works.

"But I remember meeting the author of the design Berezhtkov," said Orjonikidze. "Why isn't he at this meeting?"

Novitsky explained that Berezhtkov was not working at the works but at the ADVI in Moscow. Orjonikidze then ordered me to be sent for at once.

As soon as I arrived, I was ushered into the Commissar's office without a moment's delay. Novitsky was speaking when I came in. He was citing figures from a notebook he had in his hand. Next to him sat Podralsky, his assistant, holding in readiness like a trusty sword a fat file filled with documents and reports. Everything about that plump gentleman had an air of prosperity—his suit, his velvety grey moustache, his pink bland face. "The proverbial bad penny!" I thought. "As unsinkable as the amphibian go-devil!" Podralsky gave me a friendly nod. Novitsky imperturbably continued his speech, but Orjonikidze motioned him to stop.

The Commissar shook hands with me and asked sternly: "Comrade Berezhtkov, who is the creator of the D-31 engine?"

The unexpected severity of his tone astonished me. I answered, as I always have done, without hesitation.

"The creator of the engine is the collective body that made it."

"But who is the author? The author of the design, the man responsible for it? You're not shirking that responsibility I hope?"

"No, Comrade Orjonikidze."

"Can you tell us why your engine is not bettering her power output?"

"I can. It is because they're not handling this matter properly."

"Meaning?"

"The trouble is, Comrade Orjonikidze, that there has been no real design policy in the matter of engine refinements. The works has had three different head designers in as many years. Everyone does what he likes. There is no single organizing and directing will, no imaginative engineering."

"And that didn't worry you in the least?"

"It did."

"Then why didn't you, the designer, fight for your engine's development? Why did you let people mess about with it and ruin its future?"

"I wrote quite a lot to the works about it, Comrade Orjonikidze."

"That's no excuse. Why didn't you come and tell me about it? Who could stop you when it was a matter of life and death to your creation? Who's going to take care of your brain-child, watch its every step in life, if you, its creator, keep silent?"

I had nothing to say in my defence. Sergo went on in a milder tone.

"Tell me, Comrade Berezhkov, could you refine the engine?"

"I could. I'm absolutely convinced that if I could design that engine I could also refine it."

"Would you undertake the job?"

"Gladly."

Sergo looked at Novitsky.

"I just can't understand, Comrade Novitsky, why you didn't make use of Comrade Berezhkov."

The web of sclerotic veins on Novitsky's face stood out redly. The bags under his eyes swelled. He answered firmly.

"I had my reasons, Comrade Commissar."

"What were they?"

"I want the personnel at my works to be a healthy team



The people gathered round it were silent. Ladoshnikov said

"Let's go to your place. We'll talk about it over a glass of tea."

At the Bereshkovs' flat Ladoshnikov walked straight into the host's study and ran his eyes over the bookcases.

"I saw a book here somewhere called *Artists on Art*."

"Yes, I must have it somewhere," Bereshkov said. "I remember buying it."

"Did you read it?"

"Why, of course!" he answered without batting an eye.

After a joint search the book was found. Ladoshnikov opened it at the "Thoughts on Art" by the famous French sculptor Rodin. He marked off several passages and handed it to Bereshkov. The latter had to swallow a bitter pill. The reader, I hope, will excuse me if I cite here the passages from Rodin marked off by Ladoshnikov. Here they are.

"By some inexplicable and fatal law the person who has a portrait of himself made thwarts the talent of the artist he has himself selected by every means in his power.

"A person very rarely sees himself as he is, and even if he does, he is unpleasantly surprised when the artist faithfully conveys his likeness.

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"The more pompous a portrait or a bust is and the more it resembles a lifeless wooden doll, the more will the client like it."

"If I were you I'd never show myself in the exhibition rooms so long as that portrait of yours is hanging there," was Ladoshnikov's advice.

The outcome of this conversation (in which the two "prim maids"—Bereshkov's wife and daughter—also took part) was that Bereshkov promised his friend never to act as judge of his own portraits.

Ladoshnikov agreed to read the manuscript. I visited him again a few days later. He had gone through the novel.

His first comment was

"Amazing things happen in your line, too, it seems."

He answered the mute question pictured on my face with the explanation.

"Berezhkov's imagination plus your imagination, and as a result."

I caught the tone of approval in his voice, and broke in

"Two minuses make a plus?"

"Some minuses still remain, though. But I don't think you can do anything about it. They are in the nature of your hero. Those brain-waves of his are described much too glowingly. But then I can't pretend to give advice to a writer."

"Would you have described all these questions of creative designing differently then?"

"If I certainly would. Every one of our designers would have described it in his own way. But then it would be a different book."

all pulling together I've been working with Berezhkov for a long time and I know his style. He's undisciplined, often behaves like an individualist and an anarchist, and is capable of demoralizing the best team of men. The wisest thing is to do without his services."

"Wise? You mean the easiest, the least troublesome?" Sergo said, an angry flush mounting his cheeks. He pushed his chair back noisily, stood up, flung down his pencil, which rolled on to the floor, and added, breathing heavily, "I can imagine how Berezhkov would have felt working under such a manager."

The most expressive feature in Sergo's face were his eyes. I never really understood that boohish expression "his eyes flashed lightning" until I saw Sergo pacing his room in a temper which he barely managed to keep under control.

"Well, comrades," he said at last, "let us sum up. We have had before us a very serious and most instructive case." His glance fell upon me. "Comrade Berezhkov has invented and designed an engine and seen it through. Now the question is—who is the master, the parent of that engine? You, Comrade Berezhkov, are its parent. Yet I have to fight for your child for you. Don't you think it would only be right if we gave the engine your name? I mean calling it not the D-31 but the "Alexei Berezhkov-31." No one will have any doubts then as to its parentage. You, too, Comrade Berezhkov, will then feel responsible for it."

Orjonikidze proposed making an official request to the government to have the engine renamed.

"Any objections?" he asked.

There were none.

"The inventor of the engine should be head designer at the works," he continued. "Comrade Novitsky! Will you guarantee the necessary conditions of work to your new head designer?"

Novitsky now changed his tune.

"Why, of course. He'll be given every facility."

"Very well. This is the last time I'm accepting your word."

## BY WAY OF EPILOGUE

Two decades have passed. Ladoshnikov's airplanes and Berezhkov's engines did a good job during the great war. Ganshin's name, too, became known to the country. That greatest of sceptics among mathematicians developed the researches of Zhukovsky and supplied the theory and calculation of the jet-propulsion engine.

What will they, these shining lights of aviation and now venerable figures of its older generation, think of this book about their youth?

I took the manuscript of the novel and went to see Berezhkov. The first person I met in the hall was Vafya—that is, Valentina Berezhkova, of course. Her face, which had slightly shrunk with the years, smiled a welcome. But the look in it became guarded as soon as I handed her two bulky folders on each of which was inscribed *Berezhkov: The Story of an Inventor*.

"What's this?" she said. "Another portrait?"

"Why, have there already been such books about Alexei Nikolayevich?" I asked somewhat anxiously.

"Well, yes," my hostess answered vaguely.

She ushered me into a large room in which there stood a grand piano. At the piano, fingering the keyboard, sat a slight young girl, possibly a student already. Valentina introduced her, "Our eldest."

Then Berezhkov came into the room. Oh, my hero had filled out! That limping gait had become rather heavy.

I pointed to the folders, which I had put on a round polished table.

"Will you read that, Alexei Nikolayevich? It has to be initialled by you."

He seemed to hesitate for some reason, then, with a sidelong glance at his wife and daughter, he untied the strings and opened the manuscript at random. His greenish little eyes ran over the page. At one point the old mischievous smile came into his face. He laughed, then began reading aloud. I listened to the familiar dialogue.

"Can't we go down to the aerodrome, Alexei Nikolayevich?"

"No."

"What's it—a secret?"

"Yes, Sh. Not a word."

Berezhkov broke off reading. What would he say, I wondered. But he was silent. With another glance at his wife and daughter he tidied the pages of the manuscript and did the strings up again.

"I'm not going to read it!"

"But why?"

"I've given my word to Ladoshnikov and these prim maids here"—he shot a look at his wife and daughter—"never to express an opinion on any of my portraits. There's a fatal law."

"A fatal law?"

Berezhkov's eyes twinkled humorously. Lifting a forefinger the way he did in the old days, he whispered conspiratorially, "Sh. Not a word! It's a secret."

I was obliged to take the manuscript to Ladoshnikov. And so, by the decree of fate, the MS of my novel, together with its author, undertook a journey to Leningrad.

Ladoshnikov's flat, which had been through the war and the blockade of Leningrad, did not look half as magnificent as I had made it out to be in my book from Berezhkov's description.

The hostess came out into the hall to meet me—the same hall with the full-length mirror in front of which Berezhkov had stood a quarter of a century ago in what he had described as the classic pose of the inventor,

hugging to his breast a roll of drawings. As on that occasion, Ludmila Karlovna was dressed up and her hair was carefully set. The only difference was that Berezhkov had described her as having dark hair, whereas the neat head I saw now was almost entirely white.

The head of Ladoshnikov—of Academician Ladoshnikov, I should say—was silvery too. The shaggy eyebrows alone had withstood the ravages of time.

A lean, somewhat stooping figure, Ladoshnikov growled something about the changes that had taken place in my own appearance, and made me sit down on the divan on which I also laid the manuscript. I told him about my recent visit to Berezhkov and his mysterious reference to some fatal law.

Ladoshnikov smiled.

"It's no secret," he said, and told me the following story.

After the war a well-known Moscow artist expressed the desire to paint a portrait of Berezhkov. The latter was flattered and gave his consent. At first it was kept a secret from his wife and friends. But eventually they discovered that whenever he had a sitting he would resort to the services of a barber and go down to the artist's studio freshly shaved in the full-dress uniform of a general complete with all decorations and regalia. Valentina tried to interfere when she found it out, but Berezhkov declared, "The artist is on the right track. He is working under my direction."

A few days before the opening of the exhibition where Berezhkov's portrait was to be on view he took his friends and relatives down to admire the finished masterpiece. Ladoshnikov happening to be in Moscow at the time, Berezhkov invited him to come too.

Our hero was depicted at full length. The brass buttons and epaulettes were executed with admirable skill. The visitors saw, looking down on them, a pair of beautiful blue eyes.

"Well? What do you say?" Berezhkov asked in a tone of such concern that one would think he had painted the picture himself.

The people gathered round it were silent. Ladoshnikov said

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А. ВЕН

ТАЛАНТ

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